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OPERATIONS FOR NON-MALIGNANT DISEASE OF THE STOMACH[1]

REPORT ON 334 CASES OF OPERATION FOR NON-MALIGNANT DISEASE OF THE STOMACH

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IN the following report I have analyzed and made brief comment upon all the cases of non-malignant disease of the stomach which I had operated upon up to September, 1906. For convenience of description the cases are arranged in four groups:

GROUP 1

Group		Operations	Recoveries	Deaths
1	Cases of perforating ulcer....	27	18	9
2	Cases in which recurrent hemorrhage was the cause of immediate operation	33	27	6
3	Miscellaneous cases, given in detail later	248	246	2
4	Hour-glass stomach	26	22	4
	Total	334	313	21

Perforating Ulcer of the Stomach or Duodenum

The perforation of an ulcer of the stomach is a catastrophe which, in my experience, never comes unannounced. In all patients there has been trouble, of a greater or less degree of severity, from the ulcer. In many of the patients the symptoms have persisted for months, and in some they have been of greater severity in the weeks or days preceding the rupture of the ulcer.

When perforation occurs, there is a sudden, agonizing pain, a pain which almost reaches the limit of human endurance. But there is neither shock nor collapse, as a rule. The pulse at the first is not rapid, and the abdominal muscles may not be rigid. It is as well to insist upon these points; for, now that the surgeon is asked to see these cases almost immediately after the occurrence of the perforation, delay may be considered necessary if the pulse-rate is not quickened, and if collapse and rigidity of the abdominal muscles are absent. Exquisite tenderness of the skin I have always found. The least stroking of the surface with the finger is resented. Tenderness and pain on pressure, though general, are often present in a greater degree at one part than at another. So constantly is this the case that a careful examination of the abdomen will almost always permit of an accurate localization of the position of the ulcer which has ruptured. The onset of those symptoms formerly considered as necessary to a diagnosis — collapse, abdominal distention, rapidity and smallness of pulse — should not be allowed to develop. A diagnosis can be made from the history of ulcer, the sudden onset and the continuance of intolerable pain, restriction of thoracic movements, surface tenderness, and abdominal rigidity, or restriction of the normally free abdominal movements.

Early operation is indicated in all cases of perforation. The incision should be made to left or right, according to the position of the ulcer as ascertained by examination. The ulcer should be closed and infolded; excision

[1] Remarks contributed to a special discussion at the Royal Medical and Chirurgical Society, London, November 13, 1906.

is not necessary. If the ulcer be near the pylorus (on either side), and if its closure is at all likely to cause an obstruction, or if a second ulcer can be seen in the vicinity of the pylorus, then gastroenterostomy should be performed; in other cases it is not necessary. Drainage is necessary only in the late cases. When necessary, it should be conducted through a suprapubic incision, and the sitting posture be insisted upon afterwards.

Record of Cases. I have under my care 27 cases of perforating ulcer of the stomach or duodenum. In these 27 cases there were 18 recoveries (66.6 per cent) and 9 deaths (33.3 per cent). There were 10 cases in which a duodenal ulcer had perforated, and 17 in which a gastric ulcer had perforated. In the first 10 cases there were 6 deaths; in the last 17 cases there were 3 deaths.

The ages of the patients varied from 17 to 44. The cases of gastric ulcer were 17 in number. Of these, 3 were males, aged 29, 23, and 24; 14 females, of average 27-1½. The cases of duodenal ulcer were 10 in number. Of these, 5 were males, aged 44, 25, 22, 29, 40; 5 females, aged 17, 17, 25, 29, 38.

The perforation was found on the anterior surface of the stomach in 15 cases; on the posterior surface, in 2 cases.

In one of my cases a perforating ulcer on the anterior surface was found at the operation; it was closed in the usual manner; the patient died, and at the post-mortem examination a second perforating ulcer was found on the posterior surface at a point immediately behind the anterior ulcer ("kissing-ulcers").

In another case, a gastric ulcer was found on the anterior surface, near the lesser curvature; it was closed by suture, and the patient did well until the eleventh day, when she was seized with a sudden agony, and died in 1½ hours. At the post-mortem, the gastric ulcer was found to be soundly healed; a duodenal ulcer was perforated.

In another case, two ulcers were found to have perforated; both were on the anterior surface, about 1½ inches from each other.

In one case the perforation occurred in the center of an hour-glass stomach, and gastroplasty had to be performed. In the 10 duodenal cases, the perforation was found in the first portion 9 times; in the beginning of the second portion once. In 6 cases in the whole series, gastroenterostomy was performed immediately after the closure of the perforation; in 5 of these cases recovery followed. In 2 cases the subsequent performance of gastroenterostomy has been necessary, owing to the persistence of symptoms due to the ulcer or to the scar left by it. There were, therefore, 18 cases of recovery from the perforation; in 5 of these, gastroenterostomy had been performed, and in 1 gastroplasty for an hour-glass stomach; of the remaining 12, 2 subsequently suffered to such an extent as to necessitate the performance of a second operation — gastroenterostomy.

The present condition of all the patients in this series is perfectly satisfactory.

Group 2

Hemorrhage Cases

The classification of cases of hemorrhage from gastric or duodenal ulcer, which I proposed in a paper read before the American Surgical Association in 1903, is that which I still adopt. Hemorrhage may occur in *acute ulcer* or in *chronic ulcer*. Hemorrhage from an acute ulcer is characterized by spontaneity, abruptness of onset, the rapid loss of a large quantity of blood, the marked tendency to spontaneous cessation, the infrequency of a repetition of the hemorrhage in anything but trivial quantity, and the transience of the resulting anæmia.

Hemorrhage from a chronic ulcer may be divided into four classes, the characteristics of which are, briefly:

1. The hemorrhage is latent or concealed, is always trivial, and often inconspicuous.

2. The hemorrhage is intermittent, but in moderate quantity, occurring spontaneously and with apparent caprice at infrequent intervals. The life of the patient is never in jeopardy from loss of blood, though anæmia is a persisting symptom.

3. The hemorrhage occurs generally, but not always, after a warning exacerbation of chronic symptoms. It is rapidly repeated, is always abundant; its persistence and excess cause grave peril, and will, if unchecked, be the determining cause of the patient's death.

4. The hemorrhage is instant, overwhelming, and lethal.

In acute ulceration, under which term probably many different conditions are included, operation is never necessary. In chronic ulceration, hemorrhage is the cause of urgent operation only in those cases included in Group 3. It is the repetition of the hemorrhage in increasing quantity and at decreasing intervals that is the cause, the only cause, demanding operation for its instant relief.

When operation is undertaken, the surgeon should have in view as his immediate object the securing of the vessel which is bleeding. If the vessel can be found, and if it is accessible, it should be ligatured. But this counsel of perfection cannot always be followed; for there may be more ulcers than one in the stomach, and evidence as to which is the offender is lacking; or no ulcer may be discoverable; or the ulcer, when found, may be of such size and so indurated that a large tumor is formed in the stomach or duodenum (in one of my cases there was an inflammatory mass as large as a billiard-ball), a tumor of such size that its removal would involve a serious and prolonged operation unsuited to the patient's weak condition. In place of the ligature of the bleeding vessel, the incision of the ulcer may be performed. This is certainly preferable; but a far simpler method — one I have adopted on many occasions — is to infold the ulcer with a double row of sutures in exactly the same manner as if the ulcer had perforated. This infolding of ulcers should always be performed when feasible. It insures that the vessels supplying the ulcers from one of which the blood is coming are secured. The first line of sutures is drawn tight, and all the visible vessels are caught up by the needle. In three or four days' time all trace of the ulcer has disappeared, and it is very difficult to find where the sutures have been placed. In all cases of duodenal ulcer, as I have before advised, infolding of the ulcer or the closure of the duodenum or pylorus on the proximal side of the ulcer is necessary.

In my own cases, gastroenterostomy alone has been performed in many cases where hemorrhage was the cause of operation. The result has been satisfactory in every instance; there has not been one single recurrence of the bleeding in any case. In my recent cases I have, however, always combined infolding of the ulcer with gastroenterostomy, and this I now consider the safest and best procedure.

Record of Cases. In 33 cases I have operated for the relief of severe recurrent hemorrhage. The bleeding occurred as follows in 31 cases; in 2 cases no ulcer was found.

	Hæmatemesis Alone	Melæna Alone	Hæmatemesis and Melæna
Gastric ulcer	7	.....	9
Duodenal ulcer	.....	4	7
Gastric and duodenal ulcers	1	.....	3

There were 16 females among the 33 cases and 17 males. The distribution of the ulcers among them is shown in the next table:

	Gastric	Duodenal	Gastric and Duodenal	No Ulcer Found
Males	6	8	2	1
Females	10	3	2	1

It is evident that while the sexes appear to be equally liable to hemorrhage from an ulcer, yet, as regards the source of the hemorrhage in men, 50 per cent of the bleeding ulcers are in the duodenum, while in women the majority (66.6 per cent) are situated in the stomach. In other words, about 73 per cent of the bleeding duodenal ulcers occur in men, while of the gastric ulcers which bleed 62.5 per cent are in women.

Mortality. Six of these cases died (18 per cent); one in four hours from the operation, at which no ulcer could be found. At the autopsy, dilated gastric veins and cirrhosis of the liver were demonstrated. One became suddenly collapsed, and died in a few minutes, at the end of a week; the cause of death was not known. One died on the eleventh day, from pneumonia; one on the eighteenth day, from exhaustion; one in three weeks, from gradual exhaustion (in this case the blood contained only 27 per cent hemoglobin before operation); one a few hours after operation, from shock and exhaustion. The patient was a man, aged 62, who had bled repeatedly and copiously from a large pyloric ulcer.

In no case did hemorrhage occur after operation. In three of the cases which recovered,

the estimation of hemoglobin before operation was less than thirty per cent.

Operative Treatment. Posterior gastro-jejunostomy was performed in every case, save one. In this case the ulcer was excised; the patient died. In 21, gastro-jejunostomy was the only treatment adopted; 2 of these died. Gastro-jejunostomy was combined with excision of the ulcer in 2 cases, 1 of which died. Gastro-jejunostomy with infolding of the ulcer was done 8 times; 2 patients died. Gastro-jejunostomy with infolding of the pylorus and of the ulcer was performed once; patient recovered.

After-results. All the patients in this series are quite well, and may be considered "cured." One patient suffers a little from the painless vomiting of bile at infrequent intervals. In all other respects she is quite well, suffers no indigestion, and has gained about two stone in weight.

Group 3

Cases of Chronic Gastric and Duodenal Ulcer, etc.

The problems which are raised by a consideration of the cases included in this section are too complex for anything in the nature of a detailed examination in the brief time at one's disposal now. The great majority of the cases, however, may be summarily dismissed by the simple statement that in cases of pyloric or duodenal obstruction, gastroenterostomy is the most efficient operation in affording relief. If the ulcer be active, it should be infolded or incised, the former by preference, as being easier, quicker, and equally effective. If the ulcer area be extensive, multiple ulcers being found in the pyloric region of the stomach, with perhaps an ulcer or ulcers beyond the pylorus, Rodman's operation — that is, excision of the ulcer-bearing area — may be practised. If an ulcer in the pyloric region has to be excised, the wound left after its removal may be enlarged to permit of Finney's operation being performed. My own opinion is very emphatically in favor of posterior gastroenterostomy for all cases of simple ulcer, whether simple or multiple, involving the pyloric region of the stomach or the duodenum. With gastroenterostomy the infolding of the ulcer should be combined.

When the ulcer is seated along the lesser curvature of the stomach, it is better to excise it; in a few cases it is possible to infold it, but excision is probably safer, though certainly more difficult. Gastroenterostomy must be combined with excision, if there is a second ulcer near the pylorus. If the ulcer on the lesser curvature is solitary, gastroenterostomy is not necessary when the ulcer is excised, and may not give complete relief when the ulcer, if large, is allowed to remain. I have twice performed gastroenterostomy alone in such conditions, and though both the patients have improved, they are not quite well. In three cases I have dealt directly with the large ulcer, and in all, the result has been perfectly satisfactory.

One of the chief difficulties in the early surgical work upon diseases of the stomach was concerned with the making of an accurate diagnosis. Now, after we have been able in a large number of cases to set side by side the details of the clinical history and the disclosures of the operation-table, the difficulties are very considerably lessened. For example, duodenal ulcer, in a very great proportion of cases, can be diagnosed without any physical examination of the patient. The story he tells in his anamnesis might often have been learnt by heart from a written description, so exactly are the details, even the hours of the onset of pain, recited. But, in all cases, accurate observations should be made as to the length of stay of food in the stomach; the chemical reactions, the bacterial flora, the digestion leukocytosis, should all be investigated. Repeated stasis of food for over twelve hours means organic disease; it is not found apart from organic disease. I place a high value, though not a certain reliance, upon the chemical analysis. In addition, the surface examination of the abdomen by Mackenzie's method enables one quite frequently to localize the position of an ulcer. From every side, help is coming, and we are now able to make an accurate diagnosis of ulcer and of its situation, in the duodenum or stomach, and if in the stomach, or its whereabouts therein, in certainly the great majority of the cases. The operation of gastroenterostomy that I prefer is the posterior no-loop operation described in my book, *Abdominal Operations*. I prefer the posterior to the anterior method for a number of reasons,

which I need not now repeat; the elimination of the loop in the posterior method makes the operation no more difficult, and the results are more satisfactory. The only point which seems to me to require further consideration in order to perfect the technique of this operation is the direction of the opening between the stomach and intestine. In the description I give in *Abdominal Operations* (2d ed., pp. 171 *et seq.*) the anastomosis is shown (p. 188) to leave an opening whose direction on the stomach is from above downwards and to the right. W. J. Mayo has recently suggested that the opening should be from above downwards and to the left, isoperistaltic with the jejunum (see p. 192). In deference to so eminent authority, I performed a series of operation in this way; the result was that two cases (not included in this series, as the operations were in September last) suffered more from bilious vomiting than any I have seen since my very early days. This led me to observe in all cases the natural jejunal direction; and I found that it was by no means constant. The first few inches of the jejunum beyond the flexure may go to the left along the pancreas, horizontally or even very slightly upwards, or downwards and to the right towards the appendix, or in any direction between these two extremes. In my recent operations I have first observed accurately the direction which the jejunum takes when the colon is raised, and I have then so made the anastomosis that this direction is preserved when the operation is completed. Since doing this I have had no untoward events to record. To make the anastomosis always in one direction, either in the line Mayo suggests or in that which I suggest, is, I think, wrong. In all the cases operated on by me, when the anastomosis was made downwards and to the right, only two patients suffered in any troublesome degree from bilious vomiting. In a smaller number operated on Rith, the anastomosis in "Mayo's direction," two patients suffered to a far more serious degree. Neither the one method nor the other, then, is always right, but the principle of maintaining the normal jejunal direction in all cases will, I hope, solve the last technical difficulty in the posterior no-loop operation.

In four cases I have found the duodenum ending on the right side of the spine; this necessitated a slightly different method being adopted.

Case Records. The operations in this series number 248, and were performed on 239 patients. There were two deaths. The following classification of the cases seems the most satisfactory:

	Cases	Deaths
A. Gastric ulcer, duodenal ulcer, gastric and duodenal ulcer	206	2
B. Cholelithiasis, with gastric or duodenal ulcer	5	....
C. Cholelithiasis causing obstruction	6	....
D. Gastroptosis; no ulcer found	3	....
E. No ulcer found	6	....
F. Pyloroplasty; in two of these, gastroenterostomy had to be performed later (see *H*)	3	....
G. Secondary operations, the primary operations elsewhere	10	....
H. Secondary operations, on cases under headings *A* and *F*	9	....

Class A

In this series are 206 cases; 91 males and 115 females.

Gastric ulcer alone was found in 138 cases. Duodenal ulcer alone was found in 40 cases. Gastric and duodenal ulcers combined were found in 28 cases. The proportions occurring in the two sexes are shown thus:

	Males	Females
Gastric ulcer alone was found in	42	96
Duodenal ulcer alone was found in	30	10
Gastric and duodenal ulcers together in	19	9

Therefore gastric ulcer alone occurred more than twice as often in women as in men, while duodenal ulcer alone is three times as frequent in men as in women. If all the figures are combined, it is seen that over seventy per cent of duodenal ulcers are found in men.

Class B

There were five patients in whom an ulcer was associated with cholelithiasis; three of the ulcers were gastric, two duodenal.

All the cases were treated by gastroenterostomy. In three, the gall-bladder was also emptied and drained; in two, the gall-bladder was left alone at the operation — in one of these because the patient's condition would not allow of a further operation, in the other because

stones were also present in the common duct. In this latter case cholecystectomy and choledochotomy were subsequently performed successfully.

Class C

In six cases, cholelithiasis, or its results, were found to be interfering with the proper action of the stomach. Five patients were females; one, a male. Of these six cases, two had had cholecystotomy performed before, and adhesions had caused pyloric narrowing. In one of these, a gastroenterostomy had also been done with the aid of Murphy's button. The stomach symptoms returned after a year, and on re-opening the abdomen it was found that the anastomosis was almost closed. A second gastroenterostomy by suture was therefore performed.

In the remaining four cases, posterior gastroenterostomy and cholecystotomy were performed three times, and cholecystectomy and gastroenterostomy once. All the patients recovered. In all these cases the adhesions which existed between the stomach or duodenum and the bile-passages made it impossible to say whether ulceration in these viscera existed. In all probability, ulceration was present, or had been present, in every case.

Class D

In these cases, pyloric stenosis due to ulcer was expected. In none was it found, but in all there was marked prolapse of the stomach, which was remedied by gastropexy (Coffey's method in one case, with gastroenterostomy; Beyea's method in two cases). In one case the gall-bladder was removed. It contained a stone impacted in the cystic duct; there was a large diverticulum of the gall-bladder.

Class E

In six cases no ulcer was found. In two of these, the stomach and the first and second parts of the duodenum were much dilated. These were probably examples of a condition to which Ochsner has recently drawn attention. Two of the patients had dilated stomachs; one of the patients has suffered from hæmatemesis. In two cases the pylorus was said to be "narrowed," but no mention is made of either scar or ulcer.

Class F

Pyloroplasty, three cases; no deaths. In two cases the symptoms returned after a period of improvement; gastroenterostomy was performed in both. The third patient remains perfectly well up to the present; that is, seven years after the operation. (This patient consulted me again in January, 1907, for a recurrence of his symptoms.)

Class G

Ten secondary operations, the primary operation being performed elsewhere. In some of these cases the original condition which made operation necessary was still plainly in evidence; in others, adhesions rendered its discovery difficult or impossible. As a rule, a mechanical defect resulting from the first operation was evidently the cause of the symptoms. The cases may be tabulated thus:

Previous Gastro-jejunostomy (6 cases)

Condition Found	Operation	No. Cases
Long proximal loop.	Roux's operation.	2
Long proximal loop.	Roux's operation and gastroenteroplasty.	1
Long proximal loop.		
Constriction of distal loop by adhesion.	Lateral anastomosis.	1
	Enteroplasty.	1
Nothing abnormal found.	Nothing done.	1

Previous Gastroplication

Condition Found	Operation
Pyloric ulcer.	Posterior gastroenterostomy.

Previous Gastrolysis

Condition Found	Operation
Duodenal ulcer; adhesions.	Posterior gastroenterostomy.

Previous Explorations

Condition Found	Operation
Pyloric ulcer.	Posterior gastroenterostomy.
Duodenal ulcer? Fistula to cystic duct.	Posterior gastroenterostomy.

Class H

In eight patients whose cases are numbered under headings A and F, I have had to operate a second time. One of the patients was operated upon a third time, so that, in all, nine operations were performed. The following shows the cases:

No.	First Operation	Result	Second Operation
1	Posterior gastro-enterostomy with Laplace forceps.	Return of symptoms.	Gastroenterostomy with Murhpy's button.
2	Posterior gastro-enterostomy by suture.	Regurgitant vomiting.	Lateral anastomosis.
3	Same.	Hernia into lesser sac	Reduced; lateral anastomosis.
4	Same.	Return of symptoms.	Loop found; lateral anastomosis.
5	Same.	Same.	Opening too small; gastroenteroplasty.
6	Same.	Constant vomiting.	Gastrolysis; no relief.
7	Same.	Same.	Roux's operation; relief.
8	Pyloroplasty.	Return of symptoms.	Posterior gastro-enterostomy.
9	Same.	Same.	Same.

The following is a complete tabulation of the 248 operations:

Gastroenterostomy.	Anterior.	Simple suture	1
		Roux's operation	2
	Posterior.	Simple suture	211
		Murphy's button	1
		Laplace forceps	3
Pyloroplasty			3
Gastroduodenostomy, Finney's operation			2
Gastropexy			2
Gastroenterostomy and gastropexy			1
Gastroenterostomy and gastrostomy			1
Infolding of ulcer alone			1
Excision of ulcer alone			1
Secondary operations. First operation by other surgeons			10
Secondary operations. First operation by myself			9
			248

In four cases in the above list, other operations were performed at the same time as the gastroenterostomy. These were: radical cure of a right inguinal hernia in one case, ovariotomy for large cyst in one case, hysteropexy in one case, appendicectomy in one case. All these patients recovered.

After-results. In this complete series there are four patients who are "no better." In one, the condition found was a contracted stomach with extensive perigastritis. There are reasons for considering the condition syphilitic. The last report was that the operation "had not made much difference."

In two cases where no ulcer was found at the operation, the patients are in almost the same condition as before; the patients are "neurotic," and operative treatment has certainly not helped them in the least. In one of these cases, gastroenterostomy had been performed by another surgeon; the symptoms — hæmatemesis, melæna, and pain — were not relieved by the operation. I operated a second time, but found nothing abnormal, and I therefore closed the abdomen without doing anything further. The symptoms still persist.

In one case a large ulcer on the lesser curvature adherent to the liver was found. This patient has, after temporary marked improvement, relapsed, and is probably to be operated upon again.

In addition, there are ten cases which must be separately mentioned. In three, the ulcer was on the lesser curvature, close to the cardia, with adhesions to the under surface of the left lobe of liver and diaphragm. These patients are all better since the operation; two of them have gained one and one half stone, but all of them complain still of occasional pains, sometimes severe, radiating upwards into the chest. In one of these, pyloric obstruction also was present, due to a second ulcer. In one, the patient, who gained over three stone after the operation, has lost almost two stone of this increase, and has to restrict her food almost entirely to semi-solids and fluids.

In three cases where no ulcer was found, and gastroenterostomy performed, some benefit has resulted, but there has been no pronounced improvement in the patient's health such as we are now accustomed to expect after gastroenterostomy. In two cases the patients suffer from the occasional painless vomiting of pure bile. In other respects, the condition of both patients is quite satisfactory; neither suffers from indigestion or discomfort of any kind after food; both eat well, and both have gained weight.

In one case — a case of gastric and duodenal ulcer, where hyperchlorhydria was excessive — the patient improved very little after operation, and after some months suffered a relapse, in which a hemorrhage (melæna) occurred. At a second operation, performed elsewhere, adhesions were found around the jejunum, on the

proximal side of the anastomosis, and were taken to indicate the possible existence of a peptic jejunal ulcer. One patient has been almost constantly under treatment since her operation, at which only a few adhesions around the pylorus and about the lesser curvature were found. She is reported to be "rather better" than she was before the operation.

The result in all the remaining cases has been good. Thus, of 239 patients operated upon, 223 are quite well, 4 are no better, and 10 are to be classed as indifferent or fair results and 2 have died. In the last 151 operations in this series there has been no death. The case mortality for the complete series is 0.8 per cent.

Gastric Tetany. In this series there were fourteen cases of gastric tetany, of varying degrees of severity, from the simplest to the most serious. In all, the same conditions were present — a high degree of pyloric stenosis, moderate or considerable dilatation of the stomach, hypertrophy of the stomach musculature to a degree which made peristalsis quite obvious, and prolonged stasis of the contents of the stomach. In every case gastro-enterostomy was performed, and every patient recovered. In two cases, slight attacks of tetany were noticed for a few days after the operation, and one patient said that the attack which occurred about eighteen hours after the operation was the worse he had ever suffered.

Group 4

Hour-glass Stomach

This condition is far more common than is generally supposed. In my recent cases a diagnosis has in every instance been made before operation by attention to a series of signs which I have described fully elsewhere.

Hour-glass stomach is probably never congenital; it is always the result of cicatrical contraction in old ulcers.

Hour-glass stomach is not infrequently associated with cicatricial stenosis at the pylorus. The result is that two pouches are formed in the stomach, each being obstructed at the outlet. Since the cardiac pouch in the majority of cases is very much larger than the pyloric, the operation of gastro-enterostomy the cardiac pouch and the jejunum being attached, will afford relief to the condition. But in other cases a double operation may be necessary.

In this series there are 24 patients upon whom were performed 26 operations, and 1 operation not completed, the patient dying under chloroform. The 24 cases included 7 males and 17 females.

In several cases the history is strongly suggestive of a former perforation, while in one case a perforation was the cause of operative measures. Trilobed stomach was seen once.

Mortality. Four deaths occurred among the 24 cases: one on the fourth day, from septicæmia, resulting from a strangulated rectal prolapse; one on the third week, from suppression of urine; one on the fifth day, from pneumonia; and one died on the operating-table, from the effects of chloroform before the operation was completed.

Operative Treatment	Primary	Secondary
Gastro-jejunostomy alone	7	2
Gastro-jejunostomy and gastro-gastrostomy	3	.....
Gastro-jejunostomy and gastroplasty	2	.....
Gastro-jejunostomy and dilatation	1	.....
Gastroplasty	7	.....
Gastro-gastrostomy	2	.....
Dilatation	1	.....
Entero-anastomosis	.....	1
Total	23	3

Of the secondary operations, the entero-anastomosis was performed for regurgitant vomiting after gastro-jejunostomy; one of the secondary gastro-jejunostomies was required for relapse three years after gastroplasty, the other was performed a year later, upon a case whose condition at the first operation would only allow of a gastroplasty.

The hour-glass stomach on which Loreta's operation alone was performed was thought at the time to be due to malignant disease, but the patient made an excellent recovery, and four years later was reported quite well.

(I am much indebted to Mr. H. Upcott for his help in the preparation of the statistics in this report.)

THE RELATION OF OVARIAN CYSTS TO ABDOMINAL AND PELVIC PAIN

The Significance of Abdominal and Pelvic Pain in Patients with Ovarian Cysts; as Determined by Observations Made During the Removal of the Latter Under Local Anæsthesia

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OF all the subjective manifestations of disease, pain is the most important. It is frequently the first evidence of disease to be noticed by the patient, the one which is tolerated least, and for the relief of which a physician will usually be consulted. The presence of pain commonly implies that a sensitive part of the body has been stimulated (injured). The changes caused by disease in sensitive portions of the body, especially during the active stages of these changes, frequently give rise to pain or increase the sensitiveness of the structures affected; in less sensitive structures, these same changes would not be as readily noticed; while in those which are insensitive, pain or an appreciation of these changes would be absent. It is evident, therefore, that a knowledge of the sensibility of all parts of the body would be of great value in determining the significance of the presence or absence of pain in disease.

While a knowledge of the sensibility of the structures of the body is very valuable, it is not sufficient. We know that a sensitive structure may be altered by disease, and pain may be absent, or if present, it is not always the same. A second requirement, therefore, presents itself and that is a knowledge of the character of the pain, which may be created by different conditions affecting the same part.

As pain is not always referred to the seat of the injury or disease, a third requirement presents itself, and that is a knowledge of the location of the pain produced under different conditions.

It can be seen that pain is not always present in disease, and if present, that its severity and nature varies, not only with the sensibility of the part or parts affected but also with the nature of the alteration, and furthermore, it is not always referred to the seat of the injury.

Still other factors must be taken into consideration, such as individual peculiarities, and the general condition of the person affected. There is no doubt but that the relative sensitiveness of the same parts of the body may vary in different individuals and under different conditions of the same individual.

The significance of the presence or absence of pain, associated with abdominal and pelvic conditions, has always presented a most interesting study, and one which has been attended with great uncertainty. This uncertainty has been due to many factors; the chief of which has been our lack of an accurate knowledge of the sensibility of the abdominal and pelvic structures. We have acquired a general knowledge of the sensibility of these parts, but this knowledge has been, for the most part, obtained in an indirect manner, i. e., by the clinical study of our cases, and especially by noting conditions found at operation or autopsy. If the patient is under a general anæsthetic, or dead, we are deprived of the opportunity of directly determining the relative sensibility of the structures involved and from just which ones the pain, if present, arose. A much better method would be to test the sensibility of these structures directly, just as that of the surface of the body has been determined.

While many surgeons have reported cases operated upon under local anæsthesia, and in a few instances observations have been made by them upon the sensibility of the parts involved, is to Lennander ("Weitere Beobachtungen über Sensibilität in Organ und Gewebe und über Lokale Anästhesie", *Deut. Zeit. fur Chirurgie*, 1904, lxxiii, 297–380, and other contributions) to whom the greatest credit is due for our knowledge of the sensibility of abdominal and pelvic structures, as derived from the direct stimulation of these parts

during operations under local anæsthesia. He has shown that all pains felt within the abdomen, during these operations, are to be referred to structures which are innervated by the intercostal, lumbar or sacral nerves. The parietal peritoneum derives its sensibility from these nerves and if one of them is divided, the portion of the peritoneum innervated by it becomes insensitive. He concludes that probably all abdominal and pelvic organs are not sensitive to pain, touch, heat, or cold, and that diseases of these organs can only cause pain when they exert a mechanical or chemical stimulus on cerebro-spinal nerves in neighboring structures.

While resident gynecologist at the Johns Hopkins Hospital (Dr. Kelly's Clinic) I became much interested in Lennander's work, and determined to make similar observations whenever the opportunity presented itself. The results of some of these observations have already been reported ("Operations on the Lower Ends of the Ureters by the Inquinal Extraperitoneal Route under Local Anæsthesia," *Annals of Surgery*, 1905, 217–242).

I found that patients with large ovarian cysts afforded an excellent opportunity for testing the sensibility of the abdominal and pelvic structures. The reasons for this are apparent, a long median abdominal incision can be made under infiltration anæsthesia with very little discomfort, and after the cyst contents have been removed, the relaxation resulting affords an opportunity to gain access to many parts of the abdominal and pelvic cavity with very little additional pain to the patients.

From the report of the following ten cases we may learn, not only some of the indications for local anæsthesia and its limitations, but what is of more importance, we are able to learn something about the sensibility of ovarian cysts, and the abdominal and pelvic structures. With this latter knowledge we should the better understand, not only the significance of the presence or absence of pain in these cases, but also its significance in other abdominal and pelvic conditions.

Report of Cases demonstrating the Sensibility of Ovarian Cysts and their surrounding Structures.

Case No. 1. Miss M. H., Age 16. Johns Hopkins Gyn. No. 10743.

Diagnosis. Large cystadenoma, right ovary.

Operation. Right salpingo-cystectomy. Sept. 26, 1903.

Anæsthetics. Cocaine .1 per cent and 1 per cent, preceded by morphia, grains $\frac{1}{6}$.

Description of the Operation. A median abdominal incision, about 12 cm. long, was made under infiltration anæsthesia. Cocaine was not used again, except to infiltrate the pedicle of the cyst. After exposing the cyst, it was tapped, six litres of fluid were removed and the collapsed cyst was easily drawn out of the abdominal cavity by means of clamps. The pedicle was next exposed, cocainized with 1 per cent cocaine, ligated, cut, and the cyst removed. The abdominal incision was closed in layers.

Observations on the Sensibility of the Field of Operation. The parietal peritoneum was very sensitive to all operative manipulations and especially to those causing traction; even abdominal retractors had to be introduced and removed with the greatest care.

The cyst was insensitive, the patient did not know when it was incised, clamped or torn. The pedicle, and especially the infundibulo-pelvic ligament (containing the ovarian vessels), seemed sensitive. Traction on the pedicle, thus making traction on the retroperitoneal tissues beyond and the parietal peritoneum, caused pain which varied in severity and location. With slight traction, the patient complained of slight pain which was referred to the right lower abdomen. When this was increased, the pain became more severe and diffuse, being felt over a large area, even in the back and epigastric region. When increased still more, the patient was unable to locate it,and complained of nausea. Twisting of the pedicle caused the same sensations as traction, except they seemed to be more severe. As soon as the pedicle was released, the patient would be immediately relieved. The patient also cried out when the pedicle was clamped, even when traction had apparently been eliminated.

The right Fallopian tube, which was drawn over the cyst, seemed sensitive to pinching, as did also the uterus; they were not as sensitive as the parietal peritoneum and the infundibulo-pelvic ligament.

The omentum, intestines, and mesentery were insensitive to pinching with tissue forceps. The patient had been promised, before the operation, that she could have a general anæsthetic at any time, if the pain became too severe. She did not desire it, and afterwards stated that the operation was fatiguing and at times painful, but she was glad that a general anæsthetic had not been used. Her convalescence was uneventful.

Abdominal distension had been noticed for two years before the operation, at times dyspnœa had been present and occasionally slight indefinite abdominal pain. The patient's statements, made during the operation, seemed very reliable.

Case No. 2. Mrs. M. R., Age 48. Johns Hopkins Gyn. No. 10898.

Diagnosis. Large cystadenoma, right ovary.

Operation. Right salpingo-cystectomy, suspension of the uterus, Nov. 25, 1903.

Anæsthetic. Cocaine .1 per cent for the abdominal incision; none used after that.

Description of the Operation. As in Case 1; in addition the uterus was suspended to the peritoneum of the anterior abdominal wall by two silk sutures.

Observations on the Sensibility of the Field of Operation. These were similar to those made in the previous case. The left ovary was pinched by a pair of forceps; this caused a small amount of pain, which was attributed to the traction on the parietal peritoneum necessary to expose the ovary. The uterus and opposite tube seemed a little more sensitive than the ovary; neither were as sensitive as the parietal peritoneum or the pedicle of the tumor.

The operation was accomplished with very little pain and the convalescence was uneventful. The conditions found at operation would indicate that the cyst should not have caused pain and the patient's previous history shows that pain had not been present. The only symptoms were abdominal distension of three years' duration and frequency of micturition.

The patient's statements seemed reliable.

Case No. 3. Mrs. S. S., Age 55. Johns Hopkins Gyn. No. 10908.

Diagnosis. Large cystadenoma, left ovary.

Operation. Left salpingo-cystectomy, ventral fixation of the uterus, Nov. 28, 1903.

Anæsthetics. Morphia grains $\frac{1}{8}$ at the onset of the operation, cocaine .1 per cent was used only for the abdominal incision.

Description of the Operation. As in previous case, except that the uterus was fixed, by two silk sutures, to the recti muscles, instead of to the peritoneum of the anterior abdominal wall.

Observations on the Sensibility of the Field of Operation. These were very similar to those of the preceding case. While traction on the pedicle caused pain, its ligation and cutting caused very little. The uterus and tubes appeared to be only slightly sensitive and the opposite ovary seemed less sensitive than either of these. The convalescence was uneventful. The subjective symptoms, abdominal distension for six months without pain, were upheld by the findings at operation.

The patient's statements seemed reliable.

Case No. 4. Miss M. H., Age 63. Johns Hopkins Gyn. No. 11226.

Diagnosis. Large cystadenoma, right ovary.

Operation. Right salpingo-cystectomy, Apr. 27, 1904.

Anæsthetic. Cocaine .1 per cent.

Description of the Operation. As in previous case, except that the uterus was not fixed to the abdominal wall.

Observations on the Sensibility of the Field of Operation. The cyst-wall was found to be insensitive, and the pedicle was sensitive, as in the preceding case. The uterus appeared to be only slightly sensitive, as did also the vesical peritoneum. The opposite tube and ovary were not investigated.

Distention of the abdomen had been the only symptom and pain had not been present.

The convalescence was uneventful. Patient was very nervous and observations were made with difficulty.

Case No. 5. Mrs. A. G. (col.), Age 55. Johns Hopkins Gyn. No. 11574.

Diagnosis. Large cystadenoma, right ovary.

Operation. Right salpingo-cystectomy, Sept. 28, 1904.

Anæsthetic. As in previous operation.

Description of the Operation. This was similar to the previous operation, except in the closure of the skin. The approximation of the cut edges of this was so good that sutures were not taken.

Observations on the Sensibility of the Field of Operation. The cyst-wall was insensitive and its pedicle was only slightly sensitive to cutting and ligating, but traction caused severe pain. The patient was very nervous and further observations were unreliable.

She had noticed abdominal distension for two and a half years before the operation and had had pain in the lower right abdomen. Nothing was found to account for the latter, unless at times the tumor had dragged on its pedicle, or the latter had become temporarily slightly twisted.

The convalescence was uneventful.

Case No. 6. Mrs. E. H., Age 73. Johns Hopkins Gyn. No. 11575.

Diagnosis. Large cystadenoma of the right ovary, complete prolapse of the uterus.

Operation. Right salpingo-cystectomy, ventral fixation of the uterus, Oct. 1, 1904.

Anæsthetic. As in the previous case.

Description of the Operation. As in the previous case.

Observations on the Sensibility of the Field of Operation. The cyst-wall was insensitive, traction on its pedicle caused pain but its ligation and cutting (avoiding traction) caused very little. Uterus and tubes had very little or no sensibility, and the remaining ovary was insensitive to pinching with tissue forceps.

Her subjective symptoms had arisen from the uterine prolapse and abdominal distension.

The convalescence was uneventful.

The patient's statements seemed reliable.

Case No. 7. Mrs. E. B., Age 58. Johns Hopkins Gyn. No. 11471.

Diagnosis. Large cystadenoma, left ovary (partly intra-ligamentary). Carcinoma, left tube.

Operation. Left salpingo-cystectomy, Aug. 18, 1904.

Anæsthetics. Cocaine .1 per cent, followed by ether.

Description of the Operation. Exploratory incision was easily made and the cyst was tapped without pain. After evacuating it, it was found to be largely intra-ligamentary, and the attempt to free it caused traction on the parietal peritoneum and thus pain. This was so severe that ether was given and the operation completed.

This case illustrates a class in which the use of a local anæsthetic may not be feasible, viz., in intra-ligamentary cysts.

Case No. 8. Mrs. A. L., Age 47. Albany Hospital.

Diagnosis. Large bilateral cystadenoma (adherent).

Operation. Bilateral salpingo-cystectomy, ventral fixation of the uterus, Oct. 9, 1906.

Anæsthetics. Cocaine .1 per cent, followed by ether.

Description of the Operation. A median incision was easily made under infiltration anæsthesia. A large

cyst was tapped and evacuated without any pain. After evacuating the cyst, it was partially withdrawn, its pedicle was exposed and clamped. Clamping the pedicle caused severe pain in the right side even when all traction was avoided. As soon as the clamp was removed, the pain ceased. The cyst was adherent to the the cul-de-sac and right side of the pelvis, and in addition a second cyst was found arising from the left ovary which was not quite as large as the other, but was also adherent. On account of the presence of adhesions, a general anæsthetic was given and the operation was completed.

The convalescence was uneventful.

The patient had never suffered from pain although the cysts were adherent. Probably in walking, exercising, etc., these adhesions did not cause traction on sensitive structures.

This case illustrated another class of cases where a local anæsthetic may not be sufficient, viz., when the cyst is adherent to sensitive structures.

CASE No. 9. Miss C. C., Age 24. Johns Hopkins Gyn. No. 10487.

Diagnosis. Dermoid cyst of right ovary communicating with the sigmoid (tuberculous), intestinal, pulmonary, and tubal tuberculosis.

Operation. Hystero-salpingo-oophoro-cystectomy. Excision and closure of tuberculous area in the sigmoid, May 23, 1903.

Anæsthetics. Cocaine .1 per cent, then chloroform as a general anæsthetc.

Description of the Operation under Local Anæsthesia. The exploratory incision was easily made but attempts to free the omentum and intestines from the parietal peritoneum, to which they were adherent, caused pain, and chloroform was used.

The patient had suffered greatly with abdominal and pelvic pain before the operation. This probably arose from adhesions to sensitive structures, which exerted traction on them.

The patient died about a year later, from general tuberculosis.

CASE No 10. Mrs. C. W., Age 44. Johns Hopkins Gyn. No. 11481.

Diagnosis. Bilateral carcinomatous ovarian cysts. General peritoneal carcinosis with ascites.

Operation. Exploratory laparotomy, Aug. 20, '04.

Anæsthetics. Cocaine .1 per cent, followed by nitrous oxide gas and then chloroform (very small quantity).

Description of the Operation. Exploratory incision was easily made but the attempts to determine whether or not the carcinomatous cysts could be removed, caused so much pain that a general anæsthetic was given. The condition was found to be ineradicable.

Pain had not been present in this case, the only symptoms having been abdominal distension for two months, and loss in weight and strength.

This case illustrates another limitation of local anæsthesia; it does not permit of very extensive intraperitoneal manipulations, which are sometimes necessary. This can often be obviated by using a general anæsthetic during the time these manipulations are being made, and one of the best of these is nitrous oxide, although it does not always cause sufficient relaxation.

Results of Observations on the sensibility of ovarian cysts and their surrounding structures, and the clinical significance of these observations.

The sensibility of the walls of eight large ovarian cysts was studied, and all were found to be insensitive to touch and pain; their sensibility to pain was tested by pinching, clamping, and cutting them.

Traction on the pedicles of these cysts caused pain which became greater as the traction was increased. The pain was usually, at first, localized in the side of the abdomen at or about the pelvic brim, but as the traction was increased, it became more diffuse. When diffuse, it was felt over the entire side of the abdomen or in the back (in one case in the epigastric region). In some instances it was so diffuse that the patient was unable to locate it. Nausea was present in two instances, when the pain was severe. As soon as the pedicles were released, the patients were immediately relieved.

Clamping or pinching the pedicle gave contradictory results; in some cases it seemed to cause pain even when great care was exercised to avoid all traction on it or any other part, as the parietal peritoneum. In other cases the pedicle seemed relatively insensitive to clamping, cutting, and ligating, if these were accomplished without traction. While I have been unable to determine accurately its sensibility, it is evident that the pain arising from traction or twisting originates mostly from the mechanical stimulus (pulling) of sensitive structures beyond, such as the parietal peritoneum and possibly the retroperitoneal structures of the side and back.

My observations on the sensibility of the normal ovary, tube, and uterus do not entirely accord with those of Lennander, who thinks that they are insensitive. Here, as in testing the sensibility of the pedicle of ovarian cysts great care must be exercised in retracting or otherwise exposing the field to be investigated, as the pain experienced may arise from traction on the parietal peritoneum and not from pinching the ovary, tube, or uterus. My investigation of these structures includes other cases,

in addition to those reported here. I have been able to expose a normal ovary, and pinch it with a clamp or mouse-tooth forceps without the patient's knowledge, and have had similar experience with normal tubes and uteri. On the other hand, there have been a few instances where pinching these structures has caused pain, and under circumstances where apparently injury to known sensitive structures (as the parietal peritoneum) had been avoided. As for example, in Case 1, after the collapsed cyst had been delivered through the abdominal incision, it could be clamped or cut and the patient would not complain, but when the tube, which was elongated and drawn over the cyst, was pinched, the patient complained of pain which she could not definitely locate. I have had similar experience with the uterus, but, on the other hand, in some ventral suspensions and fixations I have been able to pass the needle and suture through uterine tissue without the patients appreciating it. These differences may be explained in various ways. Possibly the sensibility of these structures varies in different individuals; or if pain was present, there may have been some flaw in my method, and I unknowingly injured some other part which was sensitive. It must also be remembered that if the patient is nervous or tired that her statements are apt to be unreliable. Do the pelvic organs become less sensitive as the patient grows older? In my experience, intraperitoneal pelvic operations have been less painful in women past the menopause, and the instances of apparently sensitive ovaries, tubes, and uteri have occurred in younger women; but even here the apparent sensibility to pain has been inconstant, and when present it has always been much less than that of the parietal peritoneum, and the ovary has seemed the least sensitive of the three.

In all cases the parietal peritoneum was found to be *very sensitive*, and especially to traction; abdominal retractors had to be used with the greatest care; when gauze was introduced into the peritoneal cavity, it caused severe pain if it rubbed against the parietal peritoneum. The omentum and intestines were found to be insensitive to pinching.

We can readily see why an ovarian cyst does not necessarily cause pain and why it may not be sensitive to palpation. Should an ovarian cyst rupture, it would not cause pain unless the contents were such that they irritated sensitive structures, as the parietal peritoneum.

If conditions arise which cause traction on the pedicle, pain will be present, which will vary with the amount of traction. According to these observations this may be felt in the side or back, or if very severe the patient may be unable to locate it. If the traction is slight it may very well cause backache, and indefinite abdominal and pelvic pains.

Twisting of the pedicle must invariably cause severe pain, as clinical experience shows; this pain may be localized in the side or back, or it may be very diffuse and it may be accompanied by nausea. There are undoubtedly many mild attacks of twisting of the pedicle, which are relieved by a shifting of the position of the cyst with a consequent untwisting of its pedicle. In severe cases, with strangulation, another source of pain may arise in the escape of fluid from the strangulated cyst, which may cause a non-infectious irritative peritonitis.

As long as infection is limited to a cyst or involves other non-sensitive structures, pain should not be present.

Adhesions between the cyst and other structures will not cause pain unless these adhesions unite the cyst to sensitive structures, and conditions arise which cause traction on these. I recently operated upon a patient with a large adherent ovarian cyst, complicated by tuberculosis of the tubes with a resulting pelvic peritonitis causing adhesions between the cyst, intestines, and omentum but not the parietal peritoneum. As one might expect, she had never suffered any pain. On the other hand, in Case 8, pain had been very severe; but here many adhesions were present between coils of intestines and the parietal peritoneum. In like manner a malignant ovarian cyst would not necessarily cause pain.

The presence of abdominal or pelvic pain in patients with ovarian cysts usually indicates either secondary changes in the cysts, involving some sensitive nearby structure, or the presence of some other condition, independent of the cyst, which may cause pain. The principal causes of pain arising from ovarian cysts are traction

or twisting of the pedicles, or the traction on the parietal peritoneum from adhesions.

We realize that about one out of every six ovarian cysts is malignant; and as it is usually impossible to distinguish a malignant cyst from a benign one while the malignant process is still confined to the cyst, it is imperative that all ovarian cysts should be removed without delay. The presence of pain makes this even more imperative and its absence does not exclude complications, or even the possibility of malignancy and its extension beyond the cyst. The low primary mortality attended with their operative removal, if uncomplicated, makes their early diagnosis and removal all the more urgent. The operation, in selected cases, may often be easily accomplished under local anæsthesia; this diminishes the danger of the operation and obviates the discomforts of a general anæsthetic. Should the latter prove necessary at any time during the operation, it may be given, and often only during that part of the operation where it is actually needed.

I regret that these observations are of necessity fragmentary, but hope that they may at least furnish a stimulus for others, in order that we may eventually learn more concerning the sensibility of the abdominal and pelvic structures, and thereby place the clinical significance of abdominal and pelvic pain on a more rational basis.

ANCIENT MILITARY SURGERY

By NICHOLAS SENN, M. D., CHICAGO

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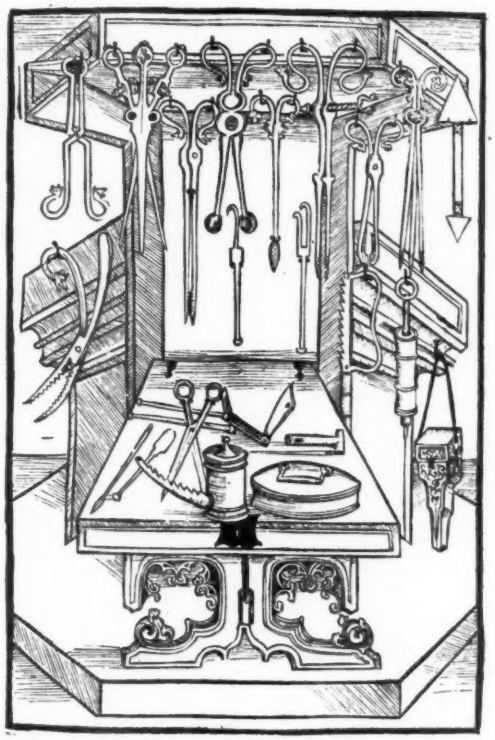
THE history of military surgery is an integral part of the history of general surgery. As a specialty, it dates back to the remote times when men trained in the art of surgery followed armies, and cared for the sick and wounded. Although the treatment of the wounded in battle was their first and most important function, it is very natural to suppose that the same men were called upon for relief in case of sudden illness, and to stay the ravages of acute infectious and contagious diseases which so frequently followed the footsteps of large armies. At one time as rigid and distinct a line was drawn between medicine and surgery in military as in civil practice. The medical department of the English army was once under the jurisdiction of a Surgeon-General and a Physician-General. During the reign of Empress Maria Theresa, of Austria, the same division between the surgical and medical services was in force. The surgical work was in the hands of barbers (Feldscheer), who were uneducated men, devoid of all knowledge of anatomy, the nature of disease, and action of drugs. These barber-surgeons were attached to the troops in the field, while the physicians, who were graduates in medicine, were stationed in the hospitals and formed a part of the General Staff. According to the army regulations, issued in the year 1769, it was ordered that the surgeons were required to furnish proof that they were competent in everything pertaining to their surgical qualifications, that they were able anatomists, and were in possession of enough knowledge of medicine to render service in the most ordinary cases of disease, such as fever, dysentery, colic, etc. The Staff-surgeons were educated physicians; but they were few in number, and their social position was not considered an honorable one. The professional relations between the barber-surgeons, and staff-surgeons and physicians, were very unpleasant and often vexatious. The latter looked down upon the field-surgeons with contempt, while these paid little or no attention to their superior officers. These dissensions and quarrels made unanimity of action in the care of the sick and wounded an impossibility, to the great detriment of those who were in need of professional services. The dissension and jealousy between the two factions did not cease even after the standing and education of the

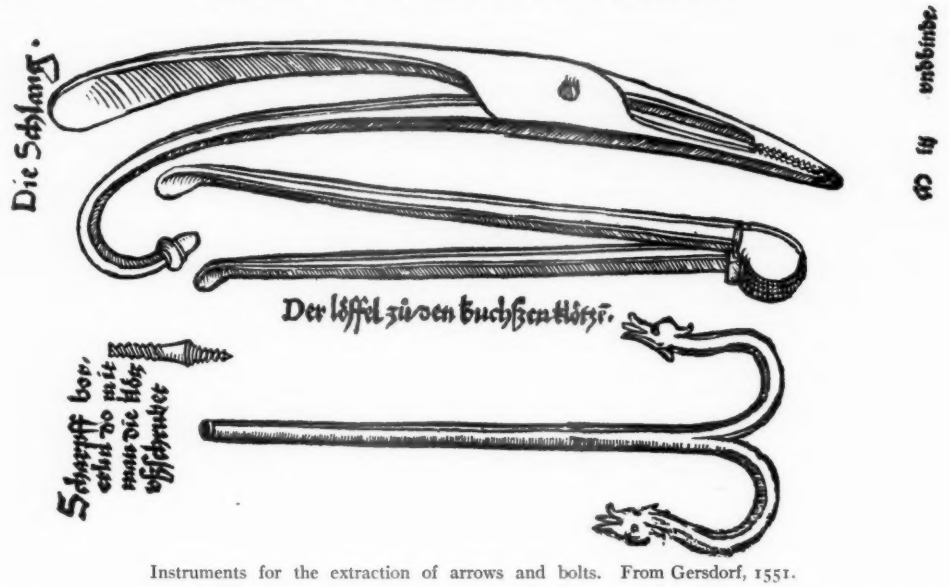
surgeons had been raised to a much higher plane. Specialization in the military service, enforced in different countries and at different times, has never proved satisfactory, and has been generally abandoned since the rank and social standing of medical officers in all civilized countries has been raised to the dignity worthy of a learned profession, by requiring candidates for the medical service to subject themselves to a most rigid examination, thus securing for the armies the most desirable and capable men. The title of this address limits me to the discussion of Ancient Military Surgery, and I shall confine myself to giving you a brief account of the surgery of primitive warfare, such as it was before the introduction of firearms.



Instrumentarium chirurgicum. From Gersdorf 1551.

WEAPONS OF ANCIENT PRIMITIVE WARFARE

The animal nature of man, a desire to injure and to kill, manifested itself in the second generation of man, when Cain slew his brother, Abel, with a club. The club or cudgel, the first and simplest implement of warfare, has held its place in history, until at the present time it remains as the most common weapon among the scattered remnants of primitive peoples in different remote parts of the world, and has become the unsightly but effective side-arm of American policemen. The next weapon was the stone, thrown by the hand or whirled with greater force with a sling. It was with this simple weapon that the obscure shepherd boy, David, killed the defiant, overbearing giant, Goliath, of the Philistine army, and in doing so, decided the victory in favor of the hesitating, doubting army of the Israelites. In the wars waged by the armies of Israel against their enemies, as related in the Old Testament, the sword, armor, and shield are constantly mentioned as the offensive and defensive weapons of war. The lance as an implement of war dates back to the time of Homer. This weapon was made popular by the display of its use by the gladiators in the Roman forum. The long wooden shaft made it possible to increase slightly the range between the combatants. At this time the chain or coat-mail came into use as a defensive armor. In the beginning of the seventeenth century, the lance was abandoned by the armies of civilized nations, except by the Poles, who were experts in its use as a warfaring weapon; but it was reintroduced again, to a limited extent, in the beginning of the nineteenth century. In 1675 the Kurfürst of Brandenburg had a mounted bodyguard of lancers. Many of the savage races use the lance as a projectile, thrown with great skill and accuracy with the hand. The Zulu throws his assaigais with fatal effect at a range of 40 yards. The Eskimo pierces the thick tough hide of the walrus with his ivory-tipped harpoon at a shorter distance and could kill a man at the same range. The halberd, a modified lance, was the common weapon of war of the Helvetians. It is a long-handled weapon of which the head had a lance point and several long sharp edges, curved or straight, and sometimes additional points or hooks, which could be made use of in climbing ramparts. The Swiss Guard, in the Vatican, retain this historic weapon to this day. Another weapon used by the Helvetians and other



Instruments for the extraction of arrows and bolts. From Gersdorf, 1551.

nations in fighting at close range, was the *morning star*. It consists of a heavy ball set with spikes, either attached to a staff or suspended from one by a chain. The weapons so far mentioned made it necessary to fight hand-to-hand, or at least at very close range. The battles carried on with them lacked the smoke, the thundering of cannons, and the rattle of musketry; the din of the conflict was made up of the clash of arms, the trample of horses and men, the dash of groaning, creaking chariots drawn by fiery steeds, the shouts of the frenzied warriors, and the groans of the wounded. It was then that

> Arms on armour, clashing bray'd
> Horrible discord, and the madding wheels
> Of brazen chariots rag'd; dire was the noise
> Of conflict.
>
> MILTON.

It was this primitive method of warfare that tried the courage and physical strength of men, when the combatants could look into each other's eyes and inhale each other's inflamed breath. It was then that the hand-to-hand encounter meant death of one or both of the combatants who happened to meet each other in the deadly duel. It was in that kind of warfare — that the dead outnumbered by far the wounded, and that after the battle more hands were needed to bury the dead than to take care of the wounded. The bow and arrow, the catapult, and the cross-bow are ancient implements of warfare, and their introduction contributed much in lessening the horrors of war, as the use of these weapons increased the distance between the fighting armies, and lessened the number of dead on the field, and increased the number of the wounded, many of whom subsequently recovered under the most unskillful treatment then in vogue. No weapon of the chase and war has had a wider distribution over the surface of the earth than the bow and arrow. Most of the primitive peoples still in existence are familiar with their use. The construction of the arrow as a piercing instrument has undergone many changes, according to the material available. The North American Indians used stone for the arrow points; other primitive peoples used bone or horn, and wherever iron could be obtained and worked, this material was used. Feathers have been attached to the shaft of the arrow to steady this projectile in its flight and make its aim more certain. The English longbow, which accomplished such remarkable results in the fourteenth and fifteenth centuries, was usually about five and one half feet long and

was made of yew, although elm and witchhazel were also used. The arrow was three feet long, feathered, and tipped with steel. The extreme range of this missile was three hundred to four hundred yards, and with it fatal wounds could be inflicted up to two hundred and fifty yards. As the killing effect of a single arrow is slight, it has been the custom of savage races, from remote times, to charge the point of the arrow with some kind of poison, both in hunting and in warfare, to insure the better its lethal effect on its living mark. In speaking of poisoned arrows, Dionis, a distinguished surgeon of the eighteenth century, expresses his opinion that civilized nations never made use of poison in warfare. Poisoned arrows are still in use by many of the African tribes, notably the pigmies of the forest regions, the Massai, Wakamba, Kilimandschuro, and Somalis. Livingstone found at Lake Nyassa arrows poisoned with strophanthus. Another poison is derived from the root of the akokanthera, still in use by some of the natives of East Africa. Stanley suspected that the pigmies prepared the poison from red ants. The experiments which have been made with these poisoned arrows on animals proved that the depressive effect of the poison caused dyspnœa, acceleration of the pulse, and finally cardiac paralysis; death being preceded by clonic spasms. So far, prompt excision of the poisoned wound, as advised by Lewin, has been the most successful treatment, as there are no antidotes known for the poison. The negroes in Central Africa prepare poison from erytophlaeum guinense, and strychnos icaja. The wounded die of tetanus. The Kalahari Bushmen, a pigmy race, obtain their poison from the larvæ of a bug (diamphidion cocusta). In the warm-blooded animals this poison produces diarrhea, hemoglobinuria, and general paralysis. The Indians of South America use curare. All of the old authors on military surgery allude to wounds inflicted by poisoned arrows, and on the importance of removing the poison from the wound, or neutralizing it by the introduction of proper remedies.

The cross-bow is simply a modification of the ordinary bow, and its projectile is a short arrow or bolt. The cross-bow was sometimes drawn by a small windlass attached to the stock. The Helvetians were experts in the use of this weapon, as shown by the two master-shots of the hero of that race, William Tell, one of which hit the apple on his son's head, and the other the heart of tyrant Gessler.

In what way the construction of this arm came to the knowledge of the Eskimo of the far North I cannot explain, but the cross-bow, at least as a toy gun for boys, I saw at Etah, in the Northern part of the West coast of Greenland. When I was at that place during the summer of 1905, one day a boy, about twelve years of age, came on board of our vessel, the "Erik," and brought with him a small cross-bow, evidently of his own make. The body was made of a piece of rough pine board, the bow was the rib of some animal, and the string was made of raw walrus hide. Short bolts of wood tipped with an iron nail were used in place of arrows. The catapult was nothing but a giant cross-bow with which stones, pieces of wood or iron were hurled with great violence, and to a much greater distance than the arrows, darts, and bolts of the cross-bow. It appears that in the catapult a rope, suddenly freed from great tension, projected an arrow or some other substance placed in a groove. There were great catapults, fixed upon a scaffold with wheels, which were used in sieges, and small ones, carried in the hand, which were employed in the field. It will be thus seen that with the invention of each successive weapon, the distance between the fighting armies was increased, and hand-to-hand combats became less frequent.

WOUNDS INFLICTED BY THE PRIMITIVE WEAPONS OF WAR

All of these ancient weapons made wounds which, if they did not kill at once, or did not involve the organs of any of the large cavities of the body, did not often prove fatal. The cleanest wounds were those inflicted by the sword and by thrusts of the lance. Death from hemorrhage seldom occurred unless a large artery was severed, which was not often the case; or when the weapons penetrated the skull or heart, or the vascular abdominal organs. The projectiles discharged from the bow, cross-bow, or catapult had no explosive effect, owing to their low velocity in their short flight from the weapon to the mark, and conse-

Wounds inflicted by ancient war implements. From Brameschurig, 1497.

quently the zone of injury was confined to the parts struck by the projectile. All these missiles made contused, torn, lacerated wounds, the most clean-cut being those inflicted with the sword. Few of the arrows passed through any part of the trunk, and most of them, when they hit a limb, were arrested in their course by striking a bone, the point of the arrow and very often a part of the wooden shaft remaining in the tissues. It was the extraction of these irregular and usually barbed arrow heads that taxed most the limited armamentarium and the ingenuity of the ancient military surgeons. The same remark applies to broken-off sword and lance points. The club and sling made fatal wounds by fracturing the skull and injuring its contents, or by inflicting subcutaneous injuries of the organs of the chest and abdomen. None of these weapons carried to any extent any foreign substances, such as clothing, hair, etc., into the wound, but the perforating implements very often lodged in the wounds they made, more especially the arrows, darts, and bolts. Wounds made with poisoned arrows were especially dreaded, as death in such cases resulted more frequently from the action of the poison than the immediate effects of the wound.

ANCIENT MILITARY SURGEONS AND THEIR PRACTICE

The origin and development of military surgery are the counterparts of surgery as practiced in civil life. In military practice, as in civil life, before anything of the art of surgery was known the laymen did what they could for the wounded by resorting to the use of the simplest remedies. The Good Samaritan poured oil and wine into the wounds of the victim of robbers he met on his way from Jericho to Jerusalem, and then took him to the little inn half-way between these cities, and made provision for his further care. The ancient warriors took care of their wounded by leading or carrying them away from the tumult of battle to a place of safety. In the heart of the simple soldier the humane treatment of the wounded had its origin. The Egyptians, Babylonians, and Hebrews entertained a high regard for the physicians of their armies, and the Sanscrit account of the Ramay-

ana of the East Indians informs us that thousands of years ago the wounded were removed from the field of battle, and were taken care of in tents, where beds of leaves were prepared for them. For a long time priests assumed the rôle of physicians and surgeons in military as well as civil practice.

While among the Egyptians surgery and medicine constituted a part of their mysteries, Greece wrested these sciences from the hands of the rude and ignorant priests by the establishment of three medical schools at Rhodos, Guidos, and Cos. At an early date the Persians had military surgeons. Xenophon relates that at the famous retreat of the ten thousand, when they arrived in the evening at several villages, eight physicians awaited their arrival and cared for the wounded, and remained with them while the army continued the retreat.

Homer says that Achilles was skilled in dressing wounds, and had a good knowledge of the virtues of medicinal plants. At the siege of Troja, the Commanders Podalirios and Machaon distinguished themselves as courageous warriors and skilled physicians. A fleet of thirty ships was used for the reception, care and transportation of the wounded, the first record in history of ships being employed for this purpose.

During the Roman Republic, her armies had no special surgeons, but their commanders, usually men of wealth, had their own private physicians, who accompanied them on the march and in battle.

A regular military medical service dates to the organization of a regular standing army by Emperor Augustus. The physicians were usually Romans, or naturalized foreigners, as only citizens were eligible to military service. The physicians attached to the army received special instruction for their vocation.

At this early date hospitals (Valetudinaria) were established for those who were severely wounded, and these were cared for by male attendants. The physicians at that time commanded little respect and were humiliated in the eyes of the soldiers by being obliged to bear slave names. Each Cohort, about one thousand men, had four physicians, and their standing was on a par with that of the non-commissioned officers. During the time of their active service, the physicians of the Roman Legions were exempt from serving in any kind of civil office, and the same privilege held good after their retirement. Among the physicians of the Legions and auxiliary Cohorts, a distinction was made between the "Medici" and Medici "Ordinarii." In the navy there were also two classes of physicians.

Of the Roman garrisons, each had one physician, while the seven Cohorts vigilum each had four physicians. Under the influence of Christianity and philosophy, it was made possible to secure later more capable surgeons for the army. Hospital corps work came into use. Litter-bearers accompanied the army; six to ten men for every two hundred to four hundred soldiers, made up a part of the army. These men were non-combatants, as in the text-books of tactics published under the reign of Emperor Leon, in Chapter XII., it is stated: "The advance guard is to be supplied with a few assistant physicians, whose duty it shall be to take care of the wounded. Each Cohort must have eight to ten agile, well-selected men, without arms, who must march one hundred steps in the rear of the soldiers. Their duty shall consist in removing from the battle-field the seriously wounded to a place of safety, and protect them against further injury." For each soldier saved, a reward of a silver dollar was promised as an inducement for these men to do their duty well. They were also required to carry with them a sufficient supply of drinking water, and to maintain the same as long as the wounded were suffering from burning thirst. Each army had a common hospital, and the sick and wounded in the field were cared for in tents, and often in private houses. The physicians at that time had no executive power, as they were subordinate to the Prefect, the Tribunes and even to non-commissioned officers.

Abul-Kasem, an Arabian surgeon of note, who lived during the latter part of the tenth century, wrote a work on medicine, which represented the practice of his time, and in which one chapter is devoted to military surgery, in which were incorporated his own experiences in the field. In severe injuries of the skull, he recommended bleeding from the

First-aid on the Battlefield. From Gersdorf, 1551.

cephalic vein on the opposite side. He dressed wounds with cotton dipped in rose oil. He made use of the ligature or cautery in arresting hemorrhage. He described suturing of intestinal wounds with catgut, made more resistant by adding to it vegetable fibers. In penetrating arrow wounds of the abdomen, he cautioned not to remove the arrow if the symptoms indicated the existence of a visceral injury. Like all the ancient authors, he extracted arrows through the wound of entrance, if possible, or forced them through the remaining tissue to the opposite side and removed them through a counter incision. If the arrow is firmly fixed in place, he recommended that the attempt at extraction should be postponed for a few days. In wounds made with poisoned arrows, he made a crucial incision for the purpose of reaching the poison with soothing remedies. Foreign bodies impacted in bones, he removed by the use of the trephine.

The Helvetians regarded the cure of the wounded as a sacred duty; but from the earliest records until to the beginning of the 16th century, the humane treatment of the wounded was limited to their own soldiers, while the wounded prisoners of war were invariably killed. This barbaric custom was sanctioned by all other nations at that time, and was one of the binding articles of the regulations of war. First aid was rendered by the soldiers, who did not hesitate to use the knife when it became necessary to extract arrows and bolts. After the battle of Laupen, Rudolph von Erlach, the commander of the troops of the Canton of Berne, issued an order to dress the wounded. It was the custom of the ancient Swiss army, in case of victory, to remain on the battle-field for three days and three nights, in order to take proper care of the wounded. Barber-surgeons were employed since the Gugler war in 1375. They had no rank, no uniform, or insignia to distinguish them from the common soldier, and received double pay of a private. They were armed and fought in the line until the battle was finished, and then took care of the wounded in the field, in neighboring houses or public buildings. As a general

rule one barber-surgeon was assigned to every 400 men.

The title "Feldscheer" appears first about the middle of the 16th century. These barber-surgeons had their apprentices, who accompanied them on the march and in the field, and who did most of the manual work. The implements of war made use of by the Swiss army at that time were the cross-bow, lances with wooden shaft eighteen feet long, halberds with shaft eight feet long, clubs, battle-axes and battle-hammers, "morning star," and two-edged swords as side-arms. The battles were always of short duration, and as the surgeons did their good share of fighting, the care of the wounded was reserved until the victory was won; and in case of defeat, the wounded fell into the hands of the executioner in place of surgeons.

The origin, growth, and advancement of the medical service in the English army is extremely interesting, and forms the counterpart of what took place in other European countries at the same time or later. After the landing of Emperor Claudius, in 43 A. D., at the triumphal feast of Brittanicus, considerable honor was also showered upon Scriborius Largus Medicus. A monument has been found in the walls of the ancient ruins of the old station at Chester, to Anicsúo Ingenuus, physician of the first Tungri Cohort, dating back to the year 207. Among the primitive Saxons, the healing art was combined with the priestly functions and mixed with mystic customs, until the tenth century, when medicine was intimately associated with theology. Medicine and theology were made two distinct professions in the year 993, by the sixth Lateran Council of the Monks. Under the reign of Edward I., the designation of Myre for physician appears first. At that time Latin editions of Hippocrates and Galen were introduced into England, and at the same time a desire arose for Oriental drugs, and with it the apothecary's art became prominent, which was unknown in England until the thirteenth century.

In 1229 the title, surgeon, came into use. Surgery at that time was intimately associated with the barber's trade. Among the military surgeons the names of Manniot and Nigellus appeared first as physicians in the Doomesday Book, twenty years after the battle of Hastings. The former was at the same time Chaplain to the King. In 1227 an English surgeon is named, who treated the wound of Edward I., inflicted by a murderer. In the year 1300 it appears that the first efforts were made to establish a sanitary corps, as in the army list a physician, two surgeons, and two assistants are mentioned. The physicans and surgeons were mounted, and were considered as soldiers, while the assistants, although mounted, were shield-bearers and had no pack-horses. In the muster roll of the army of King Edward I., in 1346, the sanitary *personnel* is not mentioned. In 1415 there were with King Henry V., a physician by the name of Colnet, and the surgeon Morestede, and twelve assistants, at the battle of Agincourt.

Queen Isabella, of Spain, in the year 1484, in the expedition against the Moors in Granada, planned the establishment of a series of hospitals to be called Lazarettos of the Queen, but the project was not realized. Henry the IV. was the first one to build and maintain permanent military hospitals, an example which from that time was imitated by other nations.

The care of the wounded and sick, by voluntary aid, dates back into the distant past. Among the Romans a voluntary corps was organized to take care of the wounded. The ancient German armies were followed by a wagon-train, which was made up and was managed by relatives and friends of the soldiers, which followed at a safe distance from the fighting line, and to which the wounded were carried and where they were cared for. On the arrival of the wounded, a careful examination of the location of wounds was made; if they were received in fronting the enemy they were carefully dressed, but if the reverse was true they met with little sympathy.

Under Emperor Moritz VI, in the sixth century, there was organized a corps of mounted litter-bearers, whose duty consisted in removing the wounded from the battlefield, and in supplying them with water and stimulants, and in dressing as well as they could their wounds. The humane intention of the Geneva Convention was anticipated in a practical way in 1743, when during the war in Flanders, Earl Stair, Commander of the English Army, effected an

Extraction of arrowhead by the use of the Diocles instrument. From Gersdorf 1551.

agreement with the Commanding-General of the French army, Marshall Noailles, that the wounded and hospitals should be considered neutral and receive the protection of both of the contending armies.

Pringle, who was the Chief Surgeon of the English army, stated that this agreement was faithfully adhered to by both armies throughout the entire campaign, and expressed the hope that this example would be imitated in all future wars.

ANCIENT TREATMENT OF WOUNDS OF WAR

Fatal and dangerous subcutaneous wounds inflicted by the use of blunt instruments, such as the club and stones, were ignored by the ancient military surgeons, whether they were laymen, priests or professionals. Implements of ancient warfare, like the sword, lance, arrow, cross-bow, and catapult, the cannon of the ancient armies, made open wounds which, in the minds of the laymen, soldiers, and ancient surgeons, appealed for surgical assistance. As many of these wounds were regarded as poisoned wounds, hot or boiling oil was considered by many as the most appropriate remedy, and although a painful procedure, the cauterizing effect of this application must have had an important influence, not as was expected, in neutralizing the action of the supposed poison, but in the prevention of infection. The use of oil and wine in the treatment of wounds dates back to the remotest period in the history of surgery, and these remedies maintained their reputation for many centuries. The oil was a soothing agent and the alcohol contained in the wine possessed potent antiseptic properties. At a later date the different kinds of spirits took largely the place of wine, and as these contained a much larger percentage of alcohol they served the purpose of stronger antiseptics, unbeknown to those who employed them. The ancient surgeons, like the ancient physicians, had great faith in the virtue of local applications, and relied upon them to accomplish impossible things. The faith of the ancient physicians in the power of external remedies drawing to the surface all sorts of bad humors, and even wood and iron, remains to-day to a certain extent in the mind of the public, educated and ignorant. My distinguished countryman, Theophrastus Paracelsus, had little confidence in surgery, but unlimited faith in remedies. In his little book on Surgery, *Wundt und Leibartzenei*, published in 1555, in speaking of the treatment of arrow wounds, on page 22, he says: "Sonderlich in den haketen pfeilen, unnd so es so hefftig wolte andringen, so geuss ein Kalts wundt öle inn die Wunden, unnd fahr mit den stich pflastern für, so würde es Gemeystert." He, like his ancestors and contemporaries, entertained the idea that arrow points lodged in the body, which could not be removed by the art of surgery, could be brought to the surface in the course of time by pouring oil into the wound, and by applying over it a drawing plaster, of which he gives many formulae, and to which he ascribed miraculous properties. His favorite styptic was composed of moss taken from skulls found in graveyards, mill-dust, rabbit's hair taken from the under-surface of the tail, and sulphate of copper. His colleague, Hyeronimus Braunschweig, or, as he called himself, Hyeronimo Bruschwig, in his book published in 1497, "Dis ist das buch der Cirurgia; Hand-

wirkung der Wundartzny," had the same blind, unlimited faith in salves to accomplish what surgery could not do: to draw to the surface lodged arrow heads which could not be extracted. I will give here literally his favorite formula:

"Frumenti
Mellis
Unreinigkeit uss dem vin vass Jedes ein halb pfunt.

Lym als do man vögel mit vohet.... viii lot
Armoniacum..... iiii lot
Bom öly..... viii lot

Und mach ein pflaster dar von un bruchs wie ich vor geseit hon. Oder mach im aber diss pflaster das do an sich züht pfyl ysen od' wachs vö isen in dem mensche steke ist.

Nim apostem der do gemacht ist nach der ler nicolai iiii lot. Magneten stein den mä bringt vö

Orient,..... ii lot
Gelben angstein,
Polipodium,
Diptani albi jedes ein halp lot.
Hasenschmalz,..... ii lot
Hanff sat öly,..... i lot

Terbentin ein halp lot, D iiii, und mach ein pflaster dar uss, und leg das dar uff."

This is by no means the longest formula he and other ancient surgeons gave for compounding salves and plasters from which they expected strange and impossible results.

Aurelius Cornelius Celsus (Liber vii, German translation by Khüffner, 1531), one of the earliest writers on arrow wounds, emphasizes the fact that owing to the peculiar shape of the arrow, its extraction is a matter of great difficulty. It must be extracted through the wound which it made, after enlarging the same by cutting, if the arrow has penetrated underneath the skin. If the weapon has caused injury of important parts and its removal through wound of entrance is not practicable, it must be forced forward and extracted through a counter opening made with a scalpel on the opposite side, but in doing so tendons and large blood-vessels must be avoided. The extraction is always difficult, owing to the narrowness of the wound made by the weapon, and much force is necessary for its extraction because it is provided with so many points. A dilator made of iron facilitates the operation. If the shaft has become detached, the point is seized with the fingers or forceps and is extracted through the wound. It is also advised to break off the points of the arrow head with forceps to facilitate the removal of the weapon. If this cannot be done, cover points with strong quills. If the arrow point is large and broad, it must always be removed through the wound of entrance with the *dioclis belulau*, an iron instrument invented by Diocles. This is a tubular instrument which is forced into the wound until it is in touch with the arrow head, which is then grasped with two fingers, when arrow and instrument are withdrawn together. If stones or other foreign bodies have penetrated the skin, they must be removed through the wound of entrance after enlarging the same by incision. If the arrow is impacted in a bone, it must be rocked to and fro to loosen it before it can be extracted with the hand or forceps. If this cannot be done, the bone on the side of the arrow head must be bored in order to loosen it. If the arrow is a poisoned one, its immediate extraction is urgently indicated, and when this has been accomplished appropriate remedies, local and general, are resorted to.

Walter Ryff (*Gross Chirurgei oder Vollkrommene Wundartznei*, 1559), of all the old authors, gives the best description of arrow wounds and their treatment. He classified arrows under six classes according to the material they are composed of, their shape and size. The points are made of iron, steel, brass, zinc, lead, horn, glass, or bone, and their shaft of wood or bamboo, usually feathered. The surgeon must be familiar with the shape of the point in deciding on the method of removal. The barbed arrows make the most trouble in attempts at extraction. If the barbs are directed backward, if there are no contra-indications, or if the arrow is lodged nearer the opposite side, it should be pushed through and removed through a counter incision. If the barbs are directed forward, it must be extracted through the wound of entrance; if forward and backward, the wound of entrance must be enlarged by incision. He refers to cases in which foreign substances have re-

mained in the tissues after healing of the wound without causing any serious trouble. If the difficulties are such that it is not safe to remove it, the case must be left to nature and the external use of drawing salves.

For several thousand years, during which the ancients waged war with the primitive weapons which I have described, the treatment of wounds remained about the same. Under favorable conditions, efforts were made to extract foreign bodies lodged in the body. Of these, imbedded arrows constituted the most frequent indications for operative intervention. The instruments were of the crudest kind, more genius being expended on their ornamentation than to make them more effective. Various forms of forceps, straight and curved, with serrated and smooth blades, all of them unnecessarily bulky, were the most important instruments. The crow-bill forceps was the most frequently recommended. An instrument called impulsor, made of a straight piece of metal with a handle, was used in pushing the arrow head through the tissues to the opposite side, from where it was extracted through an incision made in the skin. In enlarging the wound of entrance preliminary to extraction of the foreign body, the dilator (Loucher) and scissors are mentioned about as often as the knife. If the extraction of the foreign body was deemed impossible, or attended by too much immediate danger to life, salves, plasters (stich pflaster), or warm decoctions made by boiling different kinds of herbs and roots in wine, were relied upon in accomplishing what surgery could not do. As a fair sample of ancient military surgery in dealing with arrow wounds, I will quote verbatim from Braunschweig's book, referred to above. He describes, on page 19, the three methods to be pursued: "Der erst, das es uss gezogen würt mit Zangen und instrumente als hie nach un auch vor stat. Der ander weg. Das es mit gewalt durch schlagen würt das es zu der ander sitten uss gat do es nit ingangen ist. Der dryt weg, so es nit gern uss gat, oder heilsamcklichen uss Gezoggen mag werden. Ursach als ich ob geschribe hab dz du nit magst die wunde witteren i keinerley weg wed' mit mysselen oder mit Sniden, so lass man es ful werden etwa manche, so gat es gern her uss.'

He refers to a case in which an arrow point was lodged in the body, and the most famous surgeons, who were called, failed in removing it. An ordinary barber of Strassburg, by the name of Hans Meyer, was then consulted, who by deft manipulations turned round the point before making attempts to remove it. He succeeded, and at once became famous and the recipient of many honors. He cautioned the surgeons in extracting the arrow to be careful not to break off the wooden shaft, as such an occurrence would greatly enhance the difficulty in removing the detached head.

If a conservative course of treatment was decided upon, in addition to the use of drawing salves, plasters, and decoctions, a tent was inserted into the wound until the foreign body could be extracted, or was eliminated spontaneously. Both Braunschweig and Hans Gersdorf warned the surgeons not to undertake an operation, if the life of the patient was in immediate jeopardy, until the wounded received the last sacrament. Gersdorf copies almost word for word from Braunschweig in describing the symptoms indicating the existence of a penetrating wound of the heart, lungs, stomach, intestines, and bladder, all of which were regarded as mortal and in the treatment of which, both surgeons and physicians oppose any operative attempts at extraction of the arrow.

As ancient military surgery was practiced mostly by men who lacked education, the literature of that period is very scanty and unreliable. All of the ancient authors base their practice on the teachings of Hippocrates, Celsus, and Galen, the three glittering lights of ancient medicine and surgery, whose opinions dominated medical thought for centuries, and in doing so held in check the spirit of original research, and independent, unbiased, individual, and collective clinical observation.

LATENCY OF CARCINOMA

A Case of Remarkable Latency (Spontaneous Healing?) of Carcinoma

By EVARTS A. GRAHAM

(From the Pathological Laboratory of Rush Medical College)

FATTY, mucoid, and colloid changes have been known for many years to occur in carcinoma. Within the last twenty-five years more extensive degenerative processes have been described, leading, in a few rare instances, to complete retrogression and disappearance of the tumor. Instances of calcification of so-called epitheliomata have been reported by Malherbe,[1] Chenantais,[2] von Noorden,[3] Pilliet,[4] Denecke,[5] Stieda[6] and others. But sufficient evidence of malignancy is not given in the records of the cases to warrant special consideration in the present article. However, distinct healing processes in the margin of squamous-celled carcinoma were observed by Becher,[7] who describes changes in the epithelial pearls suggesting retrogression, such as atrophy and cornification of the cells, and the presence of numerous giant cells both of the myeloplax and Langhans varieties. He attributes to the giant cells a phagocytic action in removing the atrophic epithelial cells, and concludes that by means of this process a substitution of some of the pearls with young connective tissue is accomplished. Petersen[8] confirmed these findings and Swartz [9] records similar observations.

In 1883 Wehr [10] observed a case of spontaneous retrogression, or so-called healing of carcinoma, in one of a series of dogs in which experimental production of carcinoma had been produced by subcutaneous inoculation with fragments of a medullary carcinoma taken from the vaginal mucosa of a bitch. Inoculation was not followed by inflammatory reaction; and tumors appeared within two or three weeks. After reaching the size of beans in six or eight weeks, they remained stationary for awhile and then disappeared. Gaylord and Clowes [11] have collected four cases of spontaneous disappearance in human beings of growths diagnosed microscopically as carcinoma. They are as follows:

Case 1. Senger's [12] attention to the possibility of carcinoma healing spontaneously was aroused by the case of a man, 50 years of age, who presented, on examination, a hard ulcerating tumor, the size of a bean on the side of the tongue opposite the stump of a tooth. The submaxillary lymph-glands were enlarged, and a clinical diagnosis of carcinoma was made. After a few weeks, the tumor had completely disappeared without operative interference, since the patient's consent could not be obtained. Later a woman, 42 years of age, presented herself with a painful tumor, the size of a cherry, situated on the mucous membrane of the mouth opposite the stump of a molar tooth. Both a clinical and microscopical diagnosis of carcinoma was made. Half of the tumor and the offending tooth were removed. After four weeks the remaining portion of the tumor had disappeared; and no recurrence took place during the following year.

Case 2. Crosbie [13] reports the case of a patient, 17 years of age, who presented the clinical and microscopical picture of a carcinoma of the lower lip. No glandular enlargement was present. Because of an eczematous condition, the lesion was treated for a time with antiseptic ointments, after which, part of it was removed. Eight months later the lesion had disappeared except for a small cicatricial nodule. There was no recurrence within one month after the disappeareance of the ulcer.

Case 3. A. Pearce Gould[14] records the case of a woman, a nurse, 37 years old, with a primary carcinoma of the breast and multiple metastases. Three radical operations were performed for the removal of recurrent and superficial metastatic growths. Recurrent tumors appeared again but no further operation was performed. Nine months later all the nodules had disappeared. Six months elapsed between the disappearance of the growths and the report of the case.

Case 4. Rotter [15] describes a case of spontaneous healing of carcinoma of the rectum which developed in a case of multiple polypi of the sigmoid flexure and rectum.

[1] Arch. d. Physiologie, 1881, viii, 529.
[2] Thesis, Paris, 1881.
[3] Bruns's Beitr., 1888, iii, 467.
[4] Bull. d. l. Soc. anat. d. Paris, 1890, lxv, 290.
[5] Virchow Festchrift, 1893.
[6] Bruns's Beitr., 1896, xv, 797.
[7] Virchow's Archiv, 1899, 156, 62.
[8] Bruns's Beitr., 1902, xxxiv, 682.
[9] Virchow's Archiv, 1904, 175, 507.
[10] Verhandl. d. Deutsch. Gesellsch. f. Chir., 1888, i, 52.
[11] Surg., Gyn. and Obst., 1906, ii, 633.
[12] Verhandl. d. Deutsch. Gesellsch, f. Chir., 1894, xxiii, 171
[13] Brit. Med. Jour., 1899, i, 338.
[14] Clin. Soc. Trans., 1897, xxx, 205.
[15] Arch f. Klin. Chir. 1899, lviii, 357.

To the above may be added the following:

CASE 5. Richardson [16] mentions the case of a man of thirty who had a tumor of the bladder which was diagnosed both clinically and microscopically as carcinoma. A recurrence appeared soon after the operation, but the patient refused a second operation. Two years later, after treatment by a "cancer doctor," the tumor had disappeared, and there was no recurrence within the following four years.

CASE 6. Proescher [17] reports a carcinoma of the gall-bladder in a man, 22 years of age. Most of the gall-bladder was removed at operation, and found microscopically to be carcinomatous. Thirteen weeks later, because of the persistence of a small fistula, another operation was performed, in which the remainder of the gall-bladder was excised. On microscopical examination this remnant was found to contain hyalin sclerotic masses, within which were necrobiotic carcinoma cells. No recurrence was observed up to five months after the second operation.

In addition there are reported in the literature several cases of spontaneous retrogression and disappearance of tumors pronounced clinically to be carcinoma, but in which no record of microscopic examination is given. W. Roger Williams [18] cites the following cases:

CASE 1. Hutchinson records the case of a woman who had had a hard tumor of the right breast thirteen years before presenting herself to him for pulmonary trouble. On examination no tumor-mass was found on the breast but instead there was a thin, smooth, glossy scar, extending over the whole of right mammary region and beyond the mid-axillary line. The left breast was similarly affected. There were enlarged hard glands in each axilla and a hard subcutaneous nodule on the anterior border of the left axilla. No ulceration present. Pulmonary trouble found to be due to solid growth, and patient died two months later. No autopsy.

CASE 2. Bryant had under his observation a woman, 33 years old, who, nineteen years before her death, had a hard ulcerating tumor of right breast, with involvement of surrounding tissue by infiltrating growth and enlarged axillary lymph-glands. Operative interference was declined. Eight years later the tumor was found to be replaced by a puckered, linear scar and two small tubercles were present in the skin near the scar. Death occurred from pulmonary trouble without obvious increase of the local disease.

CASE 3. Broca describes the case of a woman, 69 years of age, in whom a large carcinomatous growth of the breast during several years' duration was entirely destroyed by ulceration, except for one small nodule.

[16] Trans. Amer. Surg. Ass., 1898, xvi, 309.
[17] Jour. A. M. A., 1907, xlviii, 480.
[18] 20th Cent. Prac. of Med., 1898, xvii, 394.
[19] Therap. Monats., 1903, xvi, 553.
[20] Lectures on Surg. Path., 1853, ii, 337.

CASE 4. Broca also observed an ulcerating tumor of the female breast, of fifteen years duration, in which the growth disappeared spontaneously twice and reappeared. Death occurred finally from metastasis.

Mohr [19] quotes the above cases and in addition cites the following:

CASE 5. Webb records case of carcinoma of lip. Two recurrences. Spontaneous retrogression and healing of second recurrence. Death from accident eight years later.

CASE 6. Von Hansemann reports a case of carcinoma of rectum in which the tumor advanced suddenly, then retrogressed and disappeared.

CASE 7. Mohr adds to these a case, in a man 66 years old, of spontaneous retrogression of a tumor of the mucous membrane of the mouth, diagnosed clinically as inoperable carcinoma.

Retrogression of mammary carcinoma, in connection with an acute outbreak of pulmonary tuberculosis, has been observed by Paget,[20] Sigg [21] and others. Perrin [22] has noted a subsidence of cancer after operation for goitre followed by much suppuration, and Beatson [23] has recorded a regression of breast carcinoma after oöphorectomy. Steudel [24], Lindner [25] and others record cases of subsidence of carcinoma of the stomach after gastroenterostomy.

The case to be reported presents the following history: Mrs. H., 61 years of age, in the care of Dr. A. C. Haven of Lake Forest, Ill., was operated upon in June, 1897, by Dr. L. L. McArthur, for scirrhous carcinoma of the right breast. The breast was amputated and the patient made a good recovery, and had no recurrence either at the site of the operation or in the lymph-glands. In 1899, during a severe attack of pneumonia, she was unconscious for several days. During all of the summer of 1903, the patient was ill with symptoms of diabetes insipidus. As much as 150 ounces of urine was passed in 24 hours. After gradual failure, and progressive weakness, death occurred on November 8, 1903. An autopsy was made by Professor Hektoen.

ANATOMICAL DIAGNOSIS

Old amputation of breast; secondary carcinoma of pleura, liver, pancreas and adrenals; emphysema of lung; adhesive pleuritis; atrophy of heart; mitral

[21] Cor-Bl. f. schweiz. Aerzte, 1891, xxi, 261.
[22] Rev. med. de la Suisse Rom., 1891, xi, 195
[23] Brit. Med. Jour., 1896, i, 1386.
[24] Bruns's Beitr., 1899, xxiii, 408.
[25] Bruns's Beitr., 1900, xxvi, 462.

stenosis; sclerosis of aorta; beginning aneurism of abdominal aorta; thrombosis of aorta and iliacs; atrophy of pancreas; chronic nephritis; calcified thrombi in veins of broad ligament; senile marasmus.

The body is that of an old woman, rather poorly nourished, with a large scar across the right breast, which is absent. Rigor mortis is slight. The abdominal cavity empty; peritoneum smooth. In both chest cavities is considerable clear fluid. There are adhesions over the apices of both lungs. The pericardial cavity is empty.

The lungs are light and spongy, meeting in the median line. Here and there in the pleura are flat areas of a whitish color, frequently puckered, the largest measuring about 3 cm. in diameter. The lungs show no further changes on section, except some induration at the apices. The heart is small; the coronaries convoluted; the mitral orifice greatly narrowed by thickening of the valve. The aortic valves are also thickened and stiff, and the aorta is dilated, with here and there rough places. At the beginning of the abdominal aorta is a small bulging admitting of the end of the finger. The last 15 cm. of the aorta is occluded by a yellowish, firm thrombus which extends into the iliacs. The spleen, stomach and intestines are normal. The liver is small, containing in the right lobe a rounded, whitish, firm node, about 5 cm. in diameter. The pancreas is small, containing two or three whitish areas of tumor tissue. In both adrenals are rather extensive infiltrations, with tumor tissue. In the broad ligament are numerous calcified areas and nodules apparently within the veins. Otherwise the pelvic organs are normal. The kidneys show considerable shrinking with unevenness of surface and thinness of cortex.

HISTOLOGICAL EXAMINATION

Lungs. Sections taken through the whitish puckered areas on the pleura show broken irregular rows of cells, lying in a considerable amount of stroma. There is evidently an attempt at tubule formation on the part of the tumor cells. Around the periphery of each mass are many congested capillaries and a rather dense, small, round-celled infiltration. The growth is not sharply circumscribed and limited to the pleura, but in places it extends into the alveolar walls, which are thickened near the border of the lung. In sections of some of the whitish areas, the amount of stroma is relatively greater in proportion to the number of cell cords, and in such instances there are nests of cells surrounded by a rather thick connective tissue wall. Well-formed blood-vessels are present in septa between the cell-nests. The cells composing the tumor parenchyma are, for the most part, of irregular shape but many are roughly cuboidal. The nuclei are large and granular, and of irregular shape. No mitotic figures are evident on careful search in many sections. In one section there is an appearance of a fusion of several cells having occurred, resembling giant-celled formation. Other parts of the lungs show edema and passive hyperemia.

Liver. Sections of the tumor bear a close resemblance to that in the lungs. The mass is not sharply circumscribed but cords extend into the degenerated liver tissue. The blood supply is less in evidence, and there is more of a tendency to the formation of solid cords instead of tubules. The surrounding liver tissue is compressed, so that the lobules are with difficulty made out. There is a considerable amount of pigment, which is deposited both intra- and extra-cellularly. There are a few small areas of congestion.

Pancreas. One section shows areas of carcinomatous tissue similar to that described in the lung. These are separated from each other by large amounts of connective tissue, containing large blood-vessels and dilated ducts. There are many round masses of cells which resemble islands of Langerhans, but which are surrounded by thick connective tissue. Within the adipose tissue composing part of the section is a small lymph node. Several other similar nodes are found. Another section shows large areas of digestion. The islands of Langerhans show no changes.

Adrenals. Sections show normal tissue except where the tumor is present. The tumor here also resembles that in the lung. Nests of cells are separated from each other by bands of connective tissue; and in several sections of the right adrenal a mass of tumor cells, occupying the reticular zone, is found to be surrounded by a dense capsule of connective tissue.

Kidney. The glomerular cells are indistinct, and there is some increase in connective tissue within the glomeruli. Bowman's capsule is thickened. The convoluted tubules nearly all appear necrotic or greatly degenerated. The collecting tubules appear normal but there is an increase in connective tissue as in all parts of the section. This increase between the convoluted tubules is slight. There are several dilated tubules filled with darkly-staining, homogeneous casts. There are concentric whorls of connective tissue which appear to be small arteries, the seat of endarteritis obliterans.

SUMMARY

The above case presents many interesting features. The fact that six years after the operation multiple metastatic foci were found in the viscera, without any clinical symptoms leading to a suspicion of their presence, with the gross and microscopic appearance of the nodules, is of special interest. Concerning the latter, it is noteworthy that the gross resemblance to scar tissue is borne out, to a considerable degree histologically, by the finding of dense bands of adult fibrous tissue intersecting the tumor areas; in some places there has been formed a complete capsule around the whole mass, while surrounding those areas not yet distinctly encapsulated is found young granulation tissue. In addition to these features, the presence of pseudo-giant cells, the appearance of atrophic and necrotic epithelial cells in por-

tions of some of the tumors, and the absence of mitotic figures, all point to a healing process such as is seen in chronic inflammations. Whether or not the carcinoma cells, at the time of the patient's death, had lost their ability to proliferate further is a question only of speculation. By those who agree with Volkmann in accepting a three-year limit without recurrence as a healed carcinoma, the process would have been considered, clinically, to have healed. The microscopic changes agree with those described by Gaylord and Clowes, in what they consider to be undoubted examples of spontaneous recovery of carcinoma in white mice. In their material these authors found that the nests of epithelial cells were surrounded, in some instances, by adult fibrous tissue, and in others by a zone of mononuclear leucocytes and congested capillaries; some of the tumor cells were atrophic and necrotic; and frequently, the formation of pseudo-giant cells such as described above was observed. In their bearing upon the question of spontaneous healing of carcinoma, the experiments of Apolant, Ehrlich and Haaland [26] and more recently those of Schöne [27] are of unusual interest because they demonstrate the possibility of setting up in white mice an actual immunizing process against carcinoma. Of further interest is the work of Fischer[28] who, from the fact that he was able to produce in rabbits' ears a condition histologically identical to carcinoma, by the injection of a mixture of scarlet "R" and olive oil, suggests the possible presence in the blood of individuals suffering from carcinoma of substances, called by him *attraxins*, which may exert a definite chemotactic influence on epithelial cells and incite an atypical proliferation. If such is the case, the possibility of the production of substances antagonistic to these *attraxins*, which could cause a spontaneous healing, should be considered. That actual spontaneous healing does occur, or at least that carcinoma cells frequently are rendered inert in the human body, seems reasonable, when the numerous cases of so-called "cure" of carcinoma after surgical interference are considered. For in the majority of such operations, at least, it is not likely that every carcinoma cell is removed, and the remaining ones must subsequently be overcome by a natural protective process of the body.

REPORT OF A CASE WRONGLY DIAGNOSED CEREBRAL ABSCESS, WITH THE SURGICAL FINDINGS[1]

By ALBERT E. TAUSSIG, M. D., and NORVELLE WALLACE SHARPE, M. D., St. Louis, Missouri

FEW conditions in the realm of internal medicine more frequently present diagnostic difficulties than cerebral abscess. In a large proportion of the cases, no correct diagnosis is ever possible until the autopsy is made. These patients either present no signs or symptoms permitting a diagnosis, or the picture so closely resembles some other condition as to lead astray the most experienced diagnostician. In another large group of cases the diagnosis can be made only with a certain degree of probability. Only occasionally will a case present so typical a symptom complex as to admit of a positive diagnosis and an accurate localization.

The diagnosis of cerebral abscess is practically never justified unless the three following requirements are satisfied: 1. There must be some ætiological factor recognizable as capable of producing cerebral abscess. 2. There must be evidence of suppuration somewhere. 3. There must be evidence of intracranial pressure. As regards the ætiology, the great bulk of cerebral abscesses follow cranial trauma, chronic purulent otitis media, or purulent or putrid pulmonary affections. There is not usually much difficulty in establishing the

[26] Berl. kl. Wochenschr., 1906, 2, 37.

[27] Münch. med. Wochenschr., 1906, 51, 2517.

[28] Münch. Med. Wochenschr., 1906, 53, 2041

[1] Read before the St. Louis Medical Society, March 23, 1907

existence of a possible ætiological factor. It is, however, very different as regards the recognition of the presence of suppuration. Fever may or may not be present. It is rather usual during the earliest and the terminal stages, but during the period when a diagnosis is most desirable, it may be entirely absent. Indeed, Macewen holds that a high continuous fever, or one of a pronounced septic type, is incompatible with the diagnosis of cerebral abscess. The rapid pulse of sepsis is also usually absent, being replaced by a slow pulse and one independent of the fluctuations of temperature. In those cases of cerebral abscess in which a blood examination was made, there was usually found a well marked leucocytosis, but the number of cases so studied is as yet too small for any far-reaching conclusions. The so-called peptonuria, supposed to characterize suppuration, has been found in a number of cases.

Intracranial pressure is always increased in cerebral abscess, though usually to a less degree than in tumor. The earliest and most constant manifestation of this symptom is headache. It is usually of great severity though it may be characterized by marked remissions. Horsley and others have reported cases without headache, but these seem to be rare. Cerebral vomiting is not often absent, and somnolence, alternating with restlessness and delirium, is very common. General convulsions are present in only a minority of cases, but attacks simulating Jacksonian epilepsy often occur when the lesion is near the motor cortex, whereas unilateral clonic convulsions especially characterize abscess in the temporal region. Other signs of pressure, such as vertigo, cervical stiffness, slowed or Cheyne-Stokes respiration, tachypnea, singultus, aphasia, hemiparesis, hemianæsthesia may be present or absent according to the location of the lesion. Somewhat more constant are the optic signs. Choked disk is less common than in tumor, but optic neuritis is very usual. There is often a paresis of the oculomotor nerve on the side of the abscess, resulting chiefly in mydriasis or ptosis, or both. Strabismus, too, is not uncommon. Lack of space prohibits any discussion of the signs and symptoms that make possible a more or less accurate localization of the abscess.

It will be seen that while in a typical case the diagnosis of cerebral abscess can be made readily enough, nevertheless, since any of the above signs may be missing, cases will often occur in which the diagnosis is difficult or impossible. Moreover, conditions other than cerebral abscess may show so many characteristics of this disease, and simulate it so closely, as readily to lead the diagnostician astray. An instructive case of this sort is the following.

T. M., aged 63, Irish, single; comes of a neurotic family. He has had numerous febrile attacks, probably malarial, the last one some twenty years ago. Thereafter he enjoyed good health until a year since, when he was suddenly attacked by a violent pain between the shoulder-blades that confined him to his bed for six weeks. Six months ago he was attacked by violent pain in the lower abdomen, which confined him to his bed for a week. There was no vomiting and no hypodermics were required. No further details can be elicited concerning this attack, which left him with some stomach trouble, necessitating a restricted diet. Otherwise he has been feeling well and has been able to attend to his business.

Thirty years ago he contracted what was called syphilis (no details obtainable); he was treated for three months and has had no luetic manifestations since. He has had several attacks of gonorrhœa, the last one a year ago. He was formerly a hard drinker, but some fifteen years ago took the "Keely cure" and has not drank since. Since early youth he has had a purulent otitis media on the left side. For many years there has been no acute pain, but a more or less continuous purulent discharge from the left ear.

On June 7, 1906, the patient came home feeling vaguely ill. He woke up next morning with a violent, general headache, pain in both knees and both calves and considerable vertigo. A physician, who was called, stated that his temperature was 105° and pronounced his illness, malaria. Towards evening the fever disappeared, the patient felt well and ate a hearty supper. At 2 A.M. a severe frontal headache set in, which four hours later required a hypodermic of morphine. The pain was but little affected thereby, and continued all day. During the next four days, he continued to have a, more or less, severe general headache, a varying degree of fever, and considerable pain in the joints. On June 12, his sensorium began to be clouded and he was brought to the Washington University Hospital about noon.

I saw the patient at 5 P.M. He was somewhat somnolent, but could readily be roused to answer questions, and was then entirely rational. On being left to himself, he soon sank back into a sort of stupor. He complained of severe frontal headache and of pain in both ankles, both knees, and the left shoulder Temp. 101.2°; pulse 62(!); resp. 22.

The result of the physical examination was as follows:

The patient is well-nourished, apparently not anæmic. Pupils equal, react readily to light. The teeth are very bad, the tongue dry and covered with a brown fur. No cervical stiffness. He coughs slightly. The lungs are hyper-resonant throughout, there is no cardiac dullness, and the hepatic dullness too is nearly obliterated. The respiratory murmur is emphysematous in type with few sibilant and sonorous râles. The apex beat is in the 5th interspace, just outside the mammillary line; cardiac sounds faint and distant, otherwise normal. The abdomen is slightly convex, rather rigid. There is no tenderness and nothing abnormal palpable. There is distinct redness and swelling about the left fourth metacarpo-phalangeal articulation, which is very tender to the touch. Both knees are somewhat tender about the condyles, as well as the right shoulder joint. The pulse is hard and tense, there is a high degree of arterial sclerosis. No general glandular induration or other evidence of syphilis. There is a profuse, purulent discharge from the left middle ear. The urine is acid, amber, sp. gr. 1020, contains a trace of albumen, much pus but no casts.

A provisional diagnosis of acute articular rheumatism was made, and the patient was put on aspirin 0.5 g. every three hours, hot applications to the affected joints, and cold to the head.

As a result, perhaps of the administration of aspirin, the temperature soon dropped to normal and remained there for 36 hours. During this time the pulse-rate remained low, falling to 52 at one time and rarely rising above 70. During the 14th, 15th, and 16th, the temperature was of a septic type, a noticeable feature being the non-correspondence of the pulse, which remained constantly about 80, whether the temperature was subnormal or 101°. Meanwhile, the joint disturbance became less conspicuous, that of the sensorium more so. The patient alternated between delirium and somnolence, could be aroused only with great difficulty, and immediately sank back into a stupor. There seemed to be but little tenderness about the joints, but on attempting to extend the flexed limbs, the flexors went into violent spasm, and patient gave signs of pain. No marked change in tendon reflexes, but the Babinsky reflex seemed marked, especially on the right side. Both cremasteric reflexes exaggerated.

Urine. 2100 c.c. in 24 hours; turbid, 1026, large trace of albumen, much pus, no casts. The pus contains nearly a pure culture of an intracellular diplococcus, morphologically like the gonococcus, but not decolorizing according to Gram.

Blood. No agglutination with typhoid bacilli. There are 60,000 white corpuscles per cu. mm., distributed as follows: Neutrophils 92.6 per cent, lymphocytes 4.3 per cent, large mononuclears 2.6 per cent, eosinophils 0.3 per cent, mastcells 0.2 per cent, myelocytes and other abnormal types absent. No malarial parasites.

During the next three days, the patient's temperature remained about normal. The pulse ranged somewhat higher, usually about 90. The stupor increased so that the patient could not be roused. The physical examination frequently repeated showed no essential change, except that a slight strabismus developed, there was slight ptosis of the left lid, and a well-marked Babinsky reflex on the right side.

The blood count showed 39,000 leucocytes, of which 91 per cent were polymorphonuclear neutrophils; 10 c.c. venous blood placed in 1,000 c.c. nutrient broth remained sterile in the incubator for a week.

On the morning of June 19th, the temperature had risen to 101°, where it remained, the pulse fluctuating in the neighborhood of 100. The condition was not essentially changed except that the pupils were somewhat unequal, the left being the larger. There was a well-marked Babinsky reflex on the right side. At 9.45 A.M. the patient became much excited, the muscles of the right side of the face twitched, and immediately after, the right arm and leg did the same. The convulsion lasted about two minutes. At noon he had a still more violent convulsion, entirely confined to the right half of the body, the right angle of the mouth being drawn down. The patient's stupor became deeper, his eyes rolled up, and he began to appear moribund. An operation for suspected cerebral abscess was performed at 9 P.M. by Dr. Norvelle W. Sharpe, which is described elsewhere. Just before the administration of the anæsthetic, the patient had a third convulsion, confined to the right side. No abscess was found, and death took place on the table. Immediately thereafter, the brain was removed and carefully sectioned. So far as could be seen, the brain was entirely normal, the meninges clear, no congestion, no trace of encephalitis, no abscess. All further autopsy was refused by the patient's family.

It was thus impossible to ascertain the true pathologic condition in this case. A number of features spoke against the diagnosis, cerebral abscess. Thus the involvement of the joints, especially the 4th left metacarpo-phalangeal articulation, pointed to a rheumatic element in the diease. Possibly the pyuria may have represented the clue that would have led to the correct diagnosis. The absence, however, of any indication of a renal lesion led to the assumption that the pyuria was a sequela of the comparatively recent attack of gonorrhœa. The cardiac hypertrophy was interpreted as related to the general arterial sclerosis. Unfortunately an ophthalmoscopic examination of the fundus was omitted.

Nevertheless, it would seem that the case as a whole justified the diagnosis. The purulent otitis media furnished a natural etiologic factor. The history, the temperature, and the tremendous leucocytosis indicated positively

pus formation somewhere, while the negative result of the blood culture spoke against septicemia, typhoid, central pneumonia, etc. The sopor and delirium, the slow pulse, the strabismus, the unequal pupils, the ptosis, the right-sided Babinsky reflex, the unilateral, right-sided convulsions — all spoke apparently unmistakably for a left-sided brain lesion. The fact that in spite of all this, the brain was found normal, points with instructive emphasis to the peculiar difficulty, often impossibility, of establishing the diagnosis of cerebral abscess.

TAUSSIG.

From the brief discussion over the telephone, late in the afternoon of June 19th, I gathered that Dr. Taussig inclined strongly to the belief in the existence of a cerebral abscess, and that owing to the rapidly developing septic invasion, haste was imperative. Accepting the anamnesic data, which he kindly detailed, I concurred in the probability of an intracranial pus collection, and the advisability of speedy evacuation. Preliminary preparation having been ordered, the patient was first seen about 8 P.M., lying in coma upon the operating-table. Further discussion, based upon the bedside notes and laboratory findings, confirmed belief in the clinical diagnosis. A right-sided convulsion (the third) developed just prior to the beginning of anæsthesia.

The patient seemed well-nourished, rather muscular, and evidenced the signs of an acute condition rather than the groupings, commonly associated with prolonged illness. Information of a subjective character was obviously impossible owing to the coma above noted. Anæsthesia was indicated, for the coma unaided proved not sufficiently profound to warrant surgical attack.

The skull was quickly opened, 4 cm. posterior and 3 cm. superior to the left meatus. Pulsation was not visible but was faintly transmitted to the finger; color, somewhat darker than normal owing to venous stasis; the brain bulged moderately. Cruciform section of the dura permitted exploration by grooved director in the areas classic to abscess associated with tympanic suppuration, but with negative results. Further search was now made in all directions, radiating from the original puncture as the center; this, too, proved fruitless. It was thought that the clinical manifestations warranted search below the tentorium; therefore the skull was again opened 2.5 cm. posterior to the existing hiatus and below the tentorium. Probably owing to the deceptive, sharp, undershelving of the occiput, in this brachycephalic skull, the lateral sinus was perforated. Delay was but momentary, as packing controlled the gush of blood. The infratentorial brain picture duplicated the former details, save a lessened pulsation. Exploration by grooved director, radially, as in the former instance, again proved negative. The second stage in the operation, even more than the first stage, was performed with full realization of the fact that the patient was in a desperate condition; but also cognizant that his fighting chance lay in evacuating the suspected pus cavity. Despite the skillful and persistent application of approved stimulative and restorative means, Dr. Taussig was obliged to report the steady failure of the patient's vitality;— he, however, continued to indorse the surgical attack as it rapidly developed its several steps. The conclusion was reached that no pus cavity, of appreciable magnitude, existed in the left brain. Death took place on the table.[2] Dr. Taussig requested that the calvaria be removed and the brain be thoroughly examined. The request was heartily granted, for any operator will understand the queries clamoring for satisfaction: does an abscess exist? has the exploration been a failure?

Transverse serial sections of about 7 mm. thickness of the entire cerebrum, cerebellum, pons, and medulla oblongata failed to disclose an abscess. The entire sectioned mass was, macroscopically, normal. I can but share in the keen regret of my colleague, that a complete autopsy was subsequently refused. Discussion, at this point, of the ætiologic factor and the pathologic condition which so successfully eluded critical scrutiny, must needs, therefore, be recognized as purely casuistic. Sectioning of the brain substantiated not only the non-existence of an abscess, but developed the fact that the search had been systematic and adequate, for it proved possible to follow,

[2] Constant and critical observation failed to evidence the fact, that the patient's death was accelerated by the operative attack.

through the various sections, the path made by the director. It has never before been my privilege to section a brain so promptly after an intracranial exploration, nor to examine under such favorable circumstances the trauma inflicted by a director. Nor do I happen to recall in the literature, an allusion to any similarly favorable inspection, nor its results. I record, therefore, the fact that *the director, steadily and smoothly inserted, without deviation from its axis of entry, will produce neither appreciable laceration nor visible alteration of brain tissue, save that its track will be marked, and may be traced in section, as a minute scarlet dot, a shade larger than the readily recognized circumjacent puncta vasculosa. This hemorrhage into the temporary canal formed by the entry of the director is highly insignificant. Closure of the canal by reapproximation of the separated wall is not only practically complete, but probably instantaneous, and doubtless permanent. In no instance was a patent canal-section found; nor in any instance did this puncture traumatism differ in any detail from the facts as here recorded.*

These observations but confirm the prevailing belief that *the brain may be entered by a suitable instrument, under careful manipulation, with a minimum of injury.*

By an interesting coincidence, during the same week in which the above noted exploration was made, I was invited by a colleague, a skilled pediatrist, to witness an autopsy on an infant that had died in his service, at a creche. He stated that the symptoms pointed strongly to an intracranial trouble; possibly a cerebral abscess.

Patient had been ill some 10 or 14 days; previous to that period, it had been apparently a perfectly healthy infant, subsisting upon the ordinary diet appropriate to its age. It suddenly developed a high temperature, ranging from 104 degrees upward. This was supposed to have been due to a gastro-intestinal disturbance, for which suitable dietetic and cathartic treatment had been given. Condition returned to the normal. Shortly after, there was noted marked rigidity of the extremities, with increased temperature, muscular contractions, retraction of head, no eye symptoms, no convulsions, partial suppression of urine, and loose stools. Urine was not examined. This picture continued, the various features becoming accentuated, until, following stupor and coma, death occurred. (Owing to lack of trained attendants, a closer knowledge of details had proved unobtainable.) The autopsy, about 36 hours after death, was carefully performed by a skilled pathologist. The protocols show that the skull contents were unchanged, save to an extent readily accounted for by sultry summer weather; all other viscera were practically normal, save the kidney. Both kidneys were in a condition of acute parenchymatous inflammation, with marked destructive alteration.

The importance of the question of differential diagnosis, and the rather remarkable parallelism in certain features, to the patient of Dr. Taussig's, warrant consideration of the notes of a case occurring in the service of Hoppe. Clinical diagnosis: "Brain abscess or purulent meningitis."

"L. B., aet. 28, married. Has had deafness and ear trouble since childhood. Pneumonia ten months ago. Denies syphilis. Has been demented for three days (queer actions). Brought to hospital in patrol wagon. On admission was maniacal; after twenty-four hours, alternate periods of apathy; depression with difficulty of speech, alternating with delirium and mania.

Examination. Pupils equal in size, react to light, slight divergent strabismus, opthalmic examination negative; cannot protrude tongue; responds sluggishly to questions; complains of pain in head; discharge of fetid pus from right ear; extremities weak, rigid with increased reflexes; Babinski's reflex on left side; Kernig's sign well marked; slight trace of albumin in urine; pulse varies from 60 to 70; temperature from 90 to 101.2 degrees. The difficulty of speech increased during the next few days, the stupor became more marked, and a twitching of the muscles of right side of face developed; afterward rigidity with marked twitching, but no real convulsion, of all four extremities; the pulse going to 130, the temperature to 102 degrees. During next few days, some improvement; then developed a convulsion beginning in the right arm and then becoming general. This was followed by coma and death. The autopsy showed no abscess nor purulent meningitis, nor even any congestion, but a marked case of interstitial nephritis."

An analysis of any accredited anthroponosography will confront us with the fact, and but confirm our routine clinical experience, that sundry definite diseases, or disease groups, are at times most difficult of orientation.

Without question, certain intracranial pathological conditions may be, and often are, so obscure in their manifestation, or so latent, or tardy in their development, that accurate differentiation is frequently difficult and with our present knowledge, on occasion, impossible. Particularly is this true when leisure nor environment have been afforded for critical examination.

The three cases just recorded are highly instructive, in particular the first. So strongly did the evidence tend toward a diagnosis of cerebral abscess that in spite of the fact that the picture was not absolutely complete, I was wholly in accord with my colleague in believing that an exploratory section of the skull, with search of the brain mass, was indicated. The existence of the abscess having been disproved, we are forced to consider what probable ætiologic and pathologic condition or conditions prevailed. My personal inclination would tend toward a kidney involvement with a superimposed uræmia, based largely upon the existing pyuria, and the history of "several attacks of gonorrhœa."

Even at the risk of being somewhat academic, it would seem pertinent to note that when a patient of middle or advanced age exhibits such a symptom complex as has been recorded in this report, whether there is coincidently developed an undoubted history of a syphilitic infection or not, we must bear in mind the possibility of a chronic diffuse periencephalo-meningitis. This condition, "the product of civilization and syphilization," as euphoniously and felicitously phrased by von Krafft-Ebing, is generally conceded by neurologists to be often latent, often obscure (especially in the earlier stages), and only too often undifferentiated *in vivo*. In its atypical or masked forms, it may closely simulate many conditions, including cerebral abscess. Particularly may diagnostic confusion arise when an actual abscess may variantly manifest itself; on the one hand, in an individual who is a paretic or, on the other hand, in an individual who exhibits certain more or less well-defined symptoms characteristic of this condition. Chaddock has directed our attention to the fact that "when the cerebro-spinal fluid shows a lymphocytosis and presence of an abnormal quantity of serum albumin, we have an indication of disease processes affecting the meninges, and, in doubtful cases, reliable evidence of disease of the central nervous system." This valuable diagnostic condition is unfortunately not invariably present in chronic diffuse periencephalo-meningitis but fortunately is to be found in a large majority of cases. *Per contra*, it may be added that a general leucocytosis with its obvious diagnostic significance, does not, by any means, presuppose nor include a coincident lymphocytosis of the cerebro-spinal fluid.

Illustrating the possibility of exhaustive search of an hemisphere by radial exploration through two fenestræ.

Furthermore we must bear in mind, when weighing the evidence, the following abscess-class, in which this sign must be employed with a keen sense of discrimination. These abscesses are either primarily superficial; or if primarily deep-seated, have subsequently burrowed a path to the cortex. In both instances, septic material is often found to have developed a more or less localized septic meningitis; and in both instances we may have reasonable expectation, in a fair majority of cases of finding micro-organisms in the cerebro-spinal fluid. This meningeal participation is more strikingly to be noted when we observe pus spreading over an extensive submeningeal plane. It is fairly evident that in this abscess-

class we may ordinarily anticipate that both blood and cerebro-spinal fluid will exhibit reactionary alteration.

There seems to exist a popular impression that retinal changes of a definite character (somewhat indiscriminately and loosely phrased as "choked disc," "descending neuritis," etc.) are usually, if not actually, invariably present in cerebral abscess; related thereto as effect to cause. This must be abandoned, and in future such retinal change must be anticipated only when sufficient pressure has been developed. The presence of this retinal condition is obviously of high significance; its absence, however, must not be construed as a warrant for the diagnosis, "no abscess."

It is self-evident that a brain subjected to the presence of a tumor or cyst, is not in such immediate or critical peril as one in which a suppurative process is developing. For in the former, the development is relatively leisurely in character and ordinarily not infective in nature; while in the latter, the process is frequently a progressive one, and in the majority of instances destructive in action. In the former, intracranial tension changes are slow; in the latter, frequently rapid. Viewing the question, therefore, from the practical clinical standpoint rather than the polemic, it may be laid down as a sound postulate that *while it is permissible to devote ample time for exhaustive analyses in cerebral tumors and cysts, it is absolutely imperative that a diagnosis of an intracranial suppurative process be ascertained at the earliest moment.*

But as the question of differential diagnosis is manifestly within the periphery of the internist and neurologist, in collaboration with the rhinologist, the ophthalmologist, and the aurist — to all of whom we look for authoritative *dicta* and instruction — it seems inadvisable that further amplification be permitted in this, the surgical section of the report on Dr. Taussig's case. Nor does a discussion of the treatment of a cerebral abscess seem to be indicated. Suffice it to mention that it is invariably surgical in character; and the prognosis is, *mutatis mutandis*, quite as satisfactory as those rendered for abscesses found in other structures. SHARPE.

LEONTIASIS OSSEA WITH HALISTERESIS

By CARL BECK, M. D., Chicago, Illinois
Professor of Surgical Pathology, Medical Department of the University of Illinois; Consulting Surgeon, Michael Reese Hospital; Surgeon-in-Chief, North Chicago Hospital, Chicago

LEONTIASIS ossea is the name of a disease of the bony system which is characterized by the enlargement of portions of the skeleton, especially of the head. The name was created by Virchow, who evidently compared the changed features with those of the lion, and there could hardly be made a better comparison. There was a number of skeletons and skulls in pathologic museums — one particularly characteristic one in the Museum of Modena, another one in Dupuytren Museum, of Paris, and elsewhere — which formed the basis of the studies of Virchow and the first pathologists who described this rather rare affection. In the course of years a number of cases have been published that were observed and studied during lifetime, the history of the different individuals closely scanned, and post-mortem, macroscopic, and microscopic findings were registered, and at the present time we have some material to work upon. Dr. Kanavel, who publishes in this volume an excellent *résumé* of the allied instances of this rare affection, has gathered with great diligence data for comparison, but, on the whole, the pathological condition remains obscure. It is, therefore, of great importance that every case of this rare condition, which may throw some light upon its pathology, be published.

The history of my case is as follows:

Mrs. M. K., 37 years old, a widow, has been married fifteen years, but had no children. Her father died from an incarcerated hernia; her mother is well; one

Fig. 1. Photographs showing deformity in superior maxillae.

brother died from phthisis; one from a mastoiditis; her husband, a hard drinker, died eight months ago from liver and kidney disease. She indulges in drinking a good deal, but lately has been more moderate. During her stay at the hospital she absolutely abstained from liquor. Her present trouble began about eighteen months ago. First she suffered from toothache; later from pain on the right side of her face; later in her left hip; gradually she lost strength, could not walk well, especially not get up well when sitting or lying down, and finally was confined to bed. The increase in size of her face, jaws, and finger-tips came on slowly during the past year. Her menstruation ceased. She never had a venereal infection.

Status Presens (on admission to North Chicago Hospital). Small woman, with slight skeleton; thin skin, of bronzed color. When supported she can stand up, and resting on crutches can walk a few steps, but otherwise cannot move about.

Her head is the most deformed part. The forehead is protruding slightly; the cheek bones, like two balls, sticking out, the nose almost lost between them, and only indicated by the two nostrils pointing upward; the bridge of the nose effaced. One can see that the nasal cavity is obstructed by projection of the maxillary bones toward the septum. The alveolar process of the upper maxilla is bulkily enlarged, and protruding into the mouth so that she can hardly shut her lips. The teeth that are left are carious. The lower maxilla has also some enlarged parts, especially on the sides corresponding to the ramus ascendeus.

The chest is deformed; the clavicles deformed as if fractured, and on the angles of the two parts is an enlargement like a callus. This was taken for a callus once, when she called a doctor for some pain in that region. The ribs are as if they were broken in a right angle, so that the two sides of her chest are flat and a cross-section of the chest would be a parallelogram, with the long side corresponding to the side of the chest.

One of the most striking changes is the drumstick-fingers, the first phalanx being almost twice the width of the others. The legs are atrophied, but show no enlargement. Internal organs are normal.

Urine. Examination of the urine shows: Specific gravity, 1012; acid reaction, 26 per cent; urea, 1.5 per cent; albumin, trace; no casts; sugar absent. Microscopically: Abundant bacteria and epithelia present.

The most characteristic examination is the X-ray picture. Comparing a picture of the normal skull with the picture obtained from this patient, one sees that the contours of the facial bones are effaced; that no bone structure of spongiosa is seen; that the cavities of the facial bones, especially the maxillary, are gone, or, rather, filled with the same mass that forms the bulk of the maxilla. The cranium shows the same structureless character. The skiagraph of the fingers is the most striking. It shows that the enlarged phalanx consists of a structure without bone salts, except the small epiphysis, which is normal in structure.

The patient entered the hospital January 3, 1907. Her temperature ranged between 99° and 102°; was hardly ever normal. The pulse between 90 and 120. Temperatures seemed to be caused by the otitis media serosa, which bothers the patient continually. An incision of the tympanum (by Dr. Joseph Beck) gave relief.

The patient was given saturated solution of iodide of potassium, three times daily, in increasing doses, without any result so far as the bony lesions were concerned. Later on, Fowler's solution was given in increasing doses, also without result.

March 5, patient was operated upon under scopolamin-morphine-chloroform anæsthesia, because the pains in the face began to cause great discomfort. The operation was not done for the purpose of removing the deformity, but only for the purpose of relieving the pressure upon the nerves involved, and therefore only

Fig. 2. Photograph of the patient.

the most protruding parts of the upper maxilla were removed.

Operation (as described by First Assistant, Dr. Steindler). Rose position. Incision above the largest protuberance of the alveolar process of the upper maxilla, parallel to the tooth-line, through mucosa, periosteum, down to the tumor. With scalpel and periosteotome the tumor was cut away. It was so soft that the knife cut it like cartilage. Hemorrhage was parenchymatous and profuse. The tumor-mass was grayish-white, solid and like cartilage. The mucosa of the palate was stitched to the mucosa and periosteum of the lip side, and the cavity drained with iodoform-gauze. Operation lasted one hour and ten minutes.

After-Treatment. Continuous mouth-wash, with permanganate and H_2 O_2. Patient in sitting position.

On March 6, the patient developed great dyspnœa; increasing weakness; râles over both lungs. March 11, bilateral pneumonia. March 11, 5:30 P. M., *exitus.*

Unfortunately, we were not allowed to make a post-mortem, but the incision of different parts of the cranial skeleton, as well as the finger-tips, showed that they were of the same consistency as the maxilla.

The study of the microscopic specimen is highly interesting, and is given by Dr. A. Bremken, of the Pathologic Department.

Microscopical Examination. Sections of tissue examined microscopically, were removed from tumefaction over region of the superior maxilla. The tissues were hardened in alcohol and were imbedded in paraffin. Sections were stained with hematoxylin and eosin, and polychrome methylene-blue counterstained with eosin. The best results were obtained by polychrome methylene-blue, as here the cellular elements in the trabeculæ were clearly differentiated from the surrounding structures (the ground substance).

On examination, one sees the picture of embryonic bone in the various stages of development. Bone trabeculæ are found running in an irregular manner throughout the entire section; these vary somewhat in size. Surrounding these we have a heavy stroma of connective and myxomatous tissue (Fig. 1). Connective tissue nuclei stain well with hematoxylin. Within the meshes of the stroma we find equally distributed throughout the entire section blood-vessels cut both transversely and longitudinally. They vary greatly in size. In each instance, however, but a single layer of endothelial cells constitutes their complete histology. Many of these are empty, and many are filled with red blood corpuscles. At the extreme outer margin of the tumor the blood-vessels are larger and extravasations of blood are observed. The trabeculæ of bone referred to above all contain a variable amount of osteoblasts and seemingly fully developed bone cells. The ground substance of the trabeculæ takes on a diffuse eosin stain, except their center, where there is at times a granular or amorphous, non-staining material. No histologic evidence of calcareous matter was found.

Many of these contain, however, a finely granular material which does not take on the stain. Imme-

Fig. 3. X-ray of hand showing porosity of the diaphysis of the distal phalanx.

Fig. 4. X-ray picture of the skull. The porosity of the bone in the maxilla is well shown, since in spite of the great deformity the image on the plate was not marked.

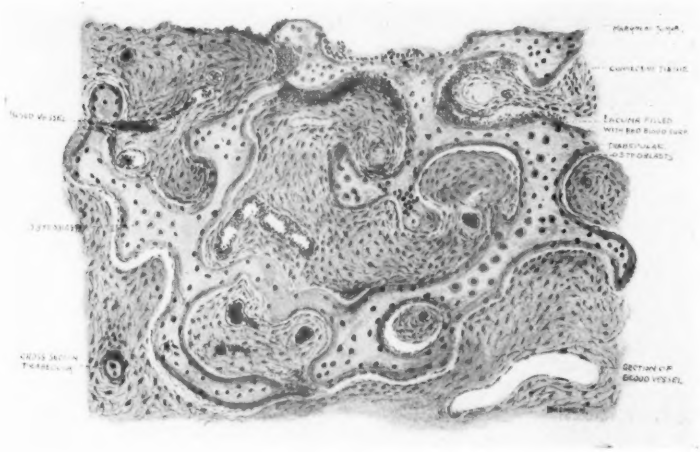


Fig. 5. Drawing made from section. Leitz. obj. No. 3. Ocular No. 4. Tube length 170 mm.

diately surrounding the trabeculæ, lacunæ are observed; these are lined with a single layer of elongated cells. The lacunæ are apparently empty. No cellular elements or granular-amorphous material were found within their lumina, except at the very outer margin of the tumor, and in the immediate vicinity of blood extravasations a few were filled with red blood corpuscles (Figs. 5 and 6).

Osteoblasts are found in the meshes of the ground substance of the trabeculæ; at the outer margin of the latter fully developed bone-cells are present (Fig. 5); no osteoclasts were found.

Small round cell infiltrations were not found generally here, and the small areas of infiltration were observed in the stroma, but always in the immediate vicinity of blood vessels.

In recapitulation of the main features of this highly interesting case, I would say that we had to deal with a case of a general disturbance of the bony system with more pronounced changes in some localities. The symptom common to all is a loss of the salts by absorption (osteohalisteresis), but at the same time an increase of the volume of the structure by new formation of two structures, one forming a framework of lamellæ, the other a connective tissue structure of the myxofibromatous character. This change of the structure explains the softness of the bones; their instability, and the deformities.

If we ask ourselves, What is the cause? we must answer, we do not know. In the past history there is nothing that could be made responsible, nor is there anything in the present findings that would explain it.

We must add the case to that number of obscure bone diseases which cannot be classed with any of the types hitherto recognized. The only common symptom of most of these cases is their appearance, facies leonina, and we cannot find a better nomenclature than Virchow's leontiasis ossea; only we add halisteretica, because it distinguishes it from those cases in which there is an increase of the bone salts, a hardening of the bones.

Nothnagel and Kundrat, of Vienna; Chiari, of Prague; Recklinghausen, of Germany; Millat and Baumgarten, of France; Starr, Bassoe, and Kanavel of America; have all given a good deal of information in describing cases and discussing the pathological features of these cases. Cephalomegalie, megalocephalie, and other names have been given to these diseases, but it is useless to give names unless they put the cases in correct class of the pathological frame.

It seems that the classification of Maximilian Sternberg, of Vienna, is best adapted to the present moment. We can speak of

1. Disturbances of the vegetation (vegetations-störungen, Kundrat), those changes which are produced by the disturbed or retarded development of the entire bony system, or some of its parts.

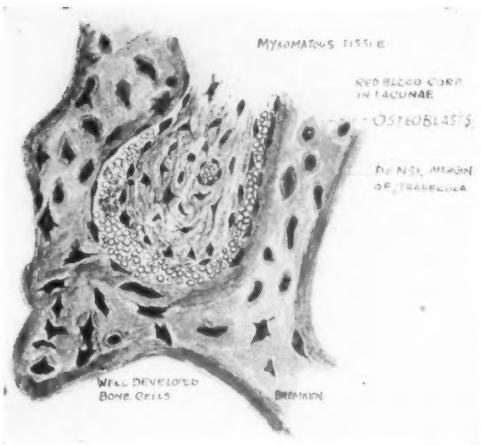


Fig. 6. Drawing from tumor at its periphery, showing red blood corpuscles in the lacunar spaces.

2. System diseases (System-Erkrankungen, Chiari), which concern parts of the skeleton, according to some metameric division.

3. Changes due to infections.

The ætiology of the first two groups is entirely obscure. There is one fact absolutely sure, that there are many more different diseases which we do not classify as yet, nor recognize.

The pathology of leontiasis ossea is a new formation of tissue, either bony or fibrous, and then fibrous in different forms, myxochondro-osteo-fibrous. What the real cause of these differences is, cannot be said.

The symptoms are the deformity and pressure upon nerves by closing of the foramina; also pressure upon vessels, causing circulatory disturbances.

Prognosis of the cases is bad; the patients do not live very long, though some cases have been observed for years.

The most important part of the diagnosis is to determine the real nature of a case which appears to have enlargement of the facial skeleton. Acromegaly, osteoma, sarcoma, odontoma, hyperplasia of the different structures, are conditions which have to be taken into consideration, and often it is difficult to differentiate.

Therapy is almost helpless. A few instances of surgical interference have given good results, but one cannot say that they have been of very progressive type. As a rule, the cases run for years, to a fatal termination. Since the changes are generalized, it is hard to determine how far surgical interference ought to go, and in this respect the surgeon has to judge what he wants to accomplish; rarely, if ever, will it be possible to remove the entire bones; only those parts which produce painful or dangerous pressure ought to be attacked.

FIBROMYOMATA OF THE ROUND LIGAMENT

A Report of Three Large Fibromyomata of the Round Ligament in the Inguinal Canal

By BARTON COOKE HIRST, M. D., and NORMAN L. KNIPE, M. D.

THE tumors about to be described are remarkable for three reasons: their rarity, their unusual size, and the proof they afford of the influence of gestation in stimulating such a growth, a fact not demonstrated by the cases hitherto reported.

No one else has ever reported as many as three cases; there are only 41 on record. Of these, 14 contained epithelial structures (adenomyoma); three showed sarcomatous degeneration. Only 8 of the 41 tumors were in the left inguinal canal.

In more than three quarters of the reported cases, the tumors were insignificant in size, from that of a nut to that of a hen's egg. The largest was described by Leopold as being the size of a man's head.

In two of the cases hitherto reported there was an ætiological association with the childbearing process, one appearing directly after parturition, the other in association with ectopic gestation; but in each one of our three, the unusual size attained was due to the stimulus of pregnancy.

Ætiology. It is no more possible to account for fibromyomata of the round ligament than for like growths in other muscular structures, except that in the case of adenomyomata, V. Recklinghausen's theory is generally accepted.

Diagnosis. These growths have been mistaken for incarcerated hernia and for enlarged lymphatic glands. One woman wore a truss for four years. The distinction, however, should easily be made. There are no evidences of inflammation, no intestinal symptoms, no sensitiveness on pressure, and no resonance on percussion. They are distinguished from enlarged lymphatic glands by their situation, between the internal and the external ring, directly above Poupart's ligament and underneath the fascia; by the fact that the tumor is almost always single, although two and even six are reported; by the large size occasionally attained and by the absence of any cause for enlarged lymphatic glands. A differential diagnosis may become difficult if, as has been the case, the fibromyoma of the round ligament in the inguinal canal is associated with an inguinal hernia or with enlarged lymphatic glands.

The appearance of a large tumor, such as we have seen, is quite distinctive (Fig. 1), a mere glance at cases two and three enabled us to make a presumptive diagnosis.

Clinical History. The rate of growth is usually very slow, but should pregnancy supervene the tumor may rapidly increase in size during gestation. In two of our cases the growth was first noticed as a small lump a month before conception, while at term the tumor was the size of a cocoanut.

There is not much pain unless the tumor grows rapidly, when a cutting or tearing sensation may be described. There is no sensitiveness on pressure. There is very limited mobility. There is a possibility of all the degenerations to which fibromyomata are subject and there seems to be a special liability to sarcomatous degeneration. As already stated, 3 out of 41 cases ended in this manner (7.31 per cent) and we think we are entitled to add another to this number: E. McK., single, white, aged 52, was admitted to a private room in the Howard Hospital Jan., 1907, with a sarcoma of the left ingunial canal the size of an apple. There was extensive infiltration of the surrounding tissue, the tumor was sloughing, the woman's condition was hopeless, and she died shortly after admission. No post-mortem examination was allowed. A sarcoma in this situation might have had a lymphatic origin, but in view of the size and situation of the growth, we feel justified in regarding it as originating in a firbomyoma of the round ligament. As we cannot be certain, however, it is not included in the three cases that we report.

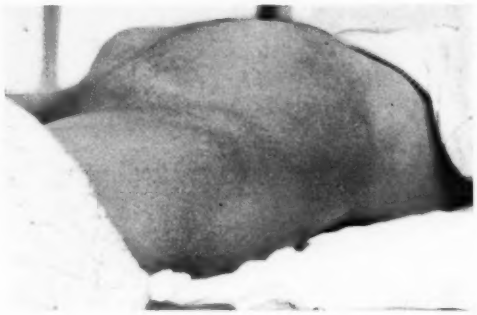


Fig. 1. Fibromyoma of the right round ligament at the inguinal canal on a woman pregnant at term.

Treatment. In view of the tendency to sarcomatous degeneration these growths should be removed as soon as they are discovered, even though they are small in size and cause no inconvenience. For their removal, the inguinal canal is laid open and, after the tumor is enucleated, is closed as in an operation for the cure of inguinal hernia. The hemorrhage is inconsiderable. If the tumor is large, the peritoneum may be adherent to its under surface, and a large opening is made into the abdominal cavity, which must be separately closed by a continuous catgut suture. All of our cases were associated with child-bearing. The first was operated on in an interval between pregnancies; the second, two weeks after delivery; in the third, labor was induced and the tumor removed under the same anæsthetization. The wounds were sealed by a collodion dressing, and in each instance healed by first intention.

BRIEF REPORT OF THE THREE CASES

Case 1. Mrs. S., para. VII. Had a fall in March, 1901, receiving a blow in ovarian region; one week later, she noticed a tumor; she had recently recovered from child-birth; fibromyoma removed from inguinal canal, 11, 22, '01.

Fig. 2. A fibromyoma of the round ligament in the inguinal canal. Weight 6½ ounces.

CASE 2. J. H., age 30, colored, para. II., delivered 10, 21, '02, in the University Maternity. First noticed tumor in right groin, December, 1901. Growth gradual till August, 1902, when it rapidly increased in size. Operation November 3, 1902; removal of tumor and repair of diastasis of recti muscles. Discharged cured.

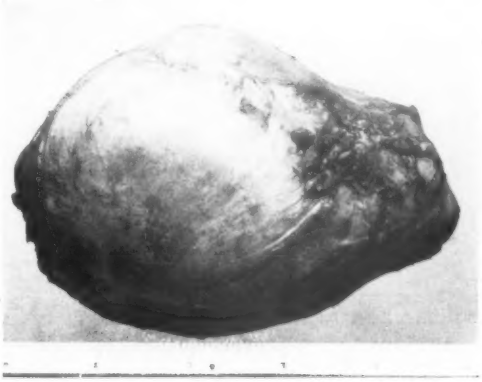


Fig. 3.

CASE 3. A. D., age 33, white, para. V. Labor induced by bougies and bags, and tumor removed, 11, 26, '06, in University Maternity. The patient had first noticed growth ten months before. Tumor grew rapidly in last four months of pregnancy. Last menstruation Feb. 26, '06. Mother and child discharged in good condition, 12, 11, '06.

Pathology. The majority of tumors of the round ligament are fibromyomata. Like all fibromyomata, they undergo benign and malignant degenerations, such as sarcomatous, lipomatous, cystic, lymphangiectatic and myxomatous.

Fig. 4.

The form of these tumors is variable. They are most often single, unevenly rounded, or oval; the surface is smooth. Sometimes they are elongated or cylindrical, closely simulating an inguinal hernia.

In a few cases the tumors were multiple, the round ligament separating into numerous fibrous bands connecting each individual tumor, making the whole very closely resemble a bunch of grapes. They have always a distinct fibrous capsule in which they are more or less movable.

Mrs. D., age 30, eight and one half month's pregnant Fibromyoma (muscle elements unusually large). Fig. 4

The gross specimen is an ovoid tumor measuring 12 cm. long, 7 cm. wide, and 6 cm. thick, and weighing 340 grams. It is encapsulated, its surface, however, rough from attachments to surrounding structures, and having here and there small patches of fat; no peritoneal covering appearing at any portion of the surface. It is of a firm, densely fleshy consistence, reminding one of a uterine fibroid but less resistant and hard than such growths ordinarily are. The cut surface of the growth when fresh, was a light pink, showing the usual coarse whorling of the tissue common to fibroid tumors.

Microscopically, it shows a well-developed fibrous capsule intermingled with a few strands of smooth muscle. The interior tissue is mainly made up of smooth muscle arranged in large and indefinite bundles. There is a tissue, intimately associated, forming investments rather of the muscle spindles than of the fascicles, considerable amount of finely fibrillar connective among, which numerous fine refractile fibrills (fibrillæ) of elastic type, are intermingled. The muscle elements are typically large (some of ordinary size, type, and with ordinary rod-shaped nuclei; the latter pale and vascular in type). The blood-vessels are not numerous, but show, as a rule, well marked perivascular round-cell

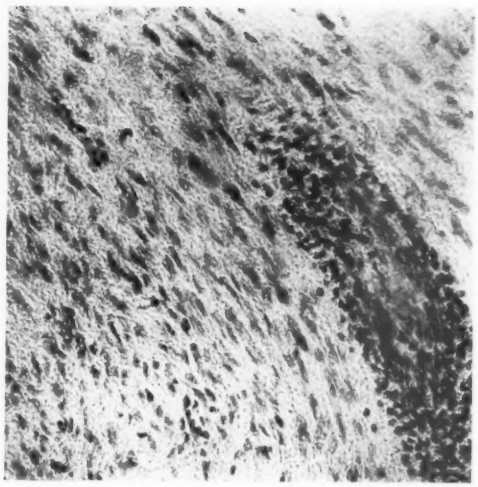


Fig. 5. Photomicrograph of a section of tumor removed from Mrs. D.

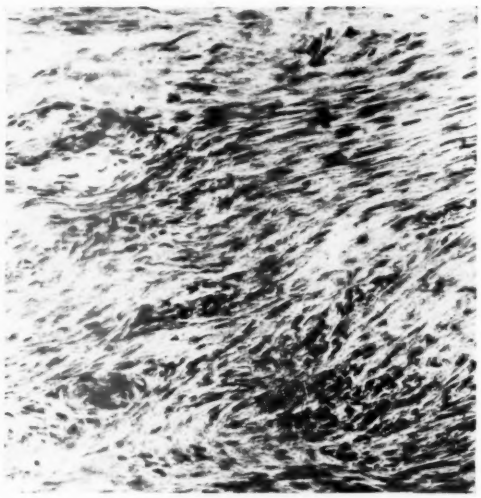


Fig. 6. Photomicrograph of a section of tumor removed from J. H.

infiltration; and some show multiplication of their lining endothelium.

J. H., age 33. Tumor removed at term. The growth is derived from the round ligament; it weighs six and one half ounces. It is an ovoid mass, covered with a thin, irregular, fatty envelope; measures 12 cm. in length, 10 cm. in thickness at the thickest part; is of pale color, firm in consistence, and presents the gross characteristics externally and on section of a fairly hard fibromatous growth.

Under the microscope, the tumor is found constituted mainly of smooth muscle in fascicles of variable size, interwoven in irregular manner. The tissue contains but little intermuscular connective tissue; and the muscular elements are in different bundles rather varied in appearance, some slender spindles with dark red-shaped nuclei. The muscle throughout is in good condition and shows no signs of degenerative or atrophic changes. The growth is only moderately vascular. The blood-vessels are usually small, with ordinary walls. There are numerous lymph-clefts throughout the tissue and their endothelial cells are more prominent than would be expected. They are not proliferated but swollen. Fig. 6.

REFERENCES

ALBERT. Tumor des Ligamentum Rotundum, etc. Gynäk. Ges. zu Dresden, May 17, 1904. Centralblatt für Gyn. No. 14, 1905.

BOUCHET. Tumeur du lig. rond. Bull. et Mem. Soc. Anat. de Paris, lxxix, 1904.

FRAENKEL, OSCAR. Das Runde Mutterband. Denkschriften der Kaiserlichen Akademie der Wissenschaft. Wien, 1902.

HULST. Beitrag zur pathologischen Anatomie des Ligamentum rotundum. Centralblatt f. Gyn., No. 10, 1905.

LEWIS. Tumors of the Round Ligament of the uterus. American Journal Obstetrics, August, 1903.

MORESTIN. Tumeur extra-inguinale du Ligament Rond. Soc. Anat. de Paris, Revue de Gyn., No. 2, 1905.

NEBESKY, OSCAR. Zur Kasuistik der vom Ligamentum Rotundum Uteri ausgehenden Neubildungen. Klinik de Dr. Ehrendorfer, Innsbruck.

SPENCER, H. R. Fibromyoma of intra-abdominal portion of round ligament of Uterus. Jour. of Obst. and Gyn. of Brit. Empire, No. 2, Lancet, Jan. 23, 1904.

SURGICAL INTERVENTION IN LEONTIASIS OSSEA[1]

A Study of the Clinical Histories and Skulls in Relation to Curative and Palliative Operations, with the Report of a Case

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UP to the present time the feasibility of surgical intervention for the cure or palliation of leontiasis ossea has not been carefully considered. The following analysis of the cases noted in the literature, with the report of one observed by myself, is made for the purpose of determining whether or not such intervention is justifiable. And in case of operation, of deciding to what extent it should be carried, and what are the probabilities of curative or palliative results.

The expression "leontiasis ossea" was first applied by Virchow to various types of so-called "hyperostoses," and while not sufficiently descriptive of the lesions which it represents, is still more widely known and nearly as scientific as the other terms introduced to designate the condition. The introduction of such descriptive names as "Diffuse Hypertrophy of Bones of the Face and Skull" (Baudon); "Hyperostosis Cranii" (Putnam); "Megalocephalie" (Allen Starr); while possibly slightly superior really only add to the confusion, and should be abandoned in favor of the earlier term until such a time as the disease can be properly classified. At the present time there is the greatest difficulty in separating it, on the one hand, from osteomas and sarcomas and, on the other, from acromegaly and von Recklinghausen's disease. For the purpose of studying the disease in its various phases, the literature has been searched and the cases arbitrarily classified as typical and atypical. Of fifty cases presenting some similarity to the disease, thirty-four have been classified as typical, and of the remaining sixteen, eight lie upon the borderland between leontiasis ossea and von Recklinghausen's disease (atypical cases, 2, 3, 4, 5, 6, 7, 8, 12; Virchow, von Heuman, von Passaeur, Beck, Lanz, Kiwull, Schieck, Heath); while three may have been acromegaly (atypical cases, 9, 10, 11; Saucerotte, Ilg, Bickersteth.) Again one of Horsley's cases must be separated from osteoma (atypical, case 1) and two cases must be considered as possible sarcomas, (atypical cases 13, 14, Piquet, Le Dentu), while Pean's case (atypical, case 15) was probably an odontoma, and Le Dentu's case (atypical, case 16) was possibly a simple epilepsy. The possible relation to osteomalacia, gigantism, and other trophic diseases will not be considered; those interested should read Bassoe's excellent article. This brief review of the atypical cases serves to show the great difficulty of classification. The most interesting question arising, is the relationship to von Recklinghausen's disease, on the one hand, and sarcoma, on the other, and to understand this confusion it would be wise to first study the various questions as to ætiology and pathology.

DEFINITION

As ordinarily understood, leontiasis ossea is a localized or diffuse hypertrophy of any or all the bones of the cranium and face. Zieglar calls it a partial gigantism which affects the bones of the cranial vault as well as those of the face.

ÆTIOLOGY

The ætiology is obscure and many opinions have been advanced. While primary injury has been suggested by some, yet the history of the various cases will not bear out that assumption. Huschke, and later Bland Sutton, thought rickets to be the fundamental factor, but the associated changes of rickets are not present. Cheine suggests the possibility of its being a localized acromegaly. In this relation, a study as to the reports upon the pituitary gland shows that this has not been observed in a sufficient number of cases to form any basis for reasoning, although the

[1]Read before the Chicago Surgical Society, March, 1907.

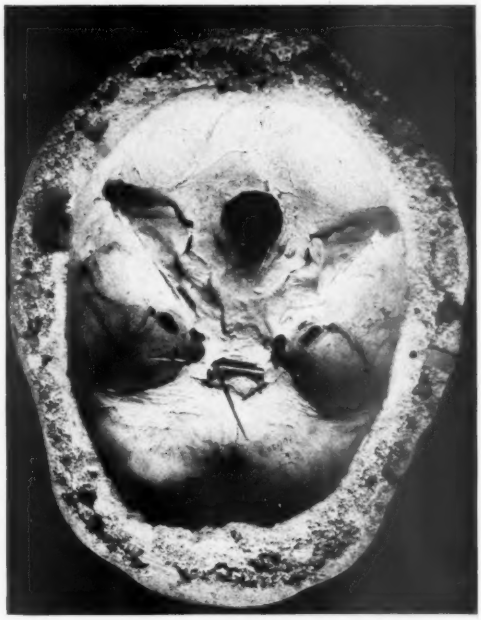

Fig. 1. Skull from the Army Medical Museum, Washington. Note the size of the foramina. Toothpicks are inserted through those which cannot be seen.

Fig. 2. Base of skull shown in Fig. 1.

atypical cases of Saucerotte, Ilg, and Bickersteth lend some support to this assumption, which is worthy of further study. Sattler's case showed an enlarged pituitary gland but no gross lesion. Stack notes that the pituitary fossa was partly obliterated and the pituitary gland normal. A relation to syphilis and osteitis deformans of Paget cannot be supported. Virchow attributed it to a periostitis. This would seem to be untenable when we consider that of twenty-five cases in which the age of onset was noted, eight were congenital or in early childhood. Moreover, it is probable that the suppurative processes noted, such as dacryocystitis and empyema of the antrum of Highmore, were secondary rather than primary, as will be shown later. He also noted that the disease corresponds to elephantiasis in the soft tissues and is ordinarily associated with some transformation of these parts. It would appear that this relationship is worthy of further study, although a majority of cases show no changes in the skin and subcutaneous tissue. There are many cases of congenital unilateral hypertrophy of the soft parts, with so little change in the bones that they cannot be considered here. Also as mentioned above, I have classified as atypical eight cases which showed extensive involvement of both bones and soft parts and presented many things in common with von Recklinghausen's disease, and one case (Allen Starr) I have classed as typical, although it presented a hypertrophy of the soft parts of the head and many pigmented areas. The bones in his case, however, were developed out of proportion to the remainder of the tissue. Virchow used the fact of this similarity in support of his assumption that infection was a possible ætiological factor, since erysipelas is a frequent forerunner of elephantiasis. It would seem, however, that a deeper trophic factor may underlie both processes. Poisson was one of the first to suggest that it may be a trophic disease of neuropathic origin. On the basis of two cases observed, Le Dentu believes that it may be a form of acute hypertrophy, with newly developing bone showing similarity to sarcoma, and in support of this describes the histological findings in one case.

Here there was an irregular osseous development, much connective tissue surrounding lacunar spaces, many osteoblasts, but no Haversian canals nor regular developing bone. The connective tissue formed in dense layers containing a certain number of embryonal cells in the vicinity of osseous islands. One sees polyhedral elements comparable to the medullary cells of bones in process of ossification, while here and there giant cells, 40 microns in size, may be seen.

Other observers, however, have not as yet corroborated his findings. Generally a condensing or rarefying periostitis has been found. The Haversian canals are few and incomplete, and in some cases one notices a rich vascular network with new bony tissue. The authors have described the tissues as soft enough to be gauged away with a curette, and again in other cases as of ivory hardness. Heath (Baumgarten) described the tissue as showing Haversian canals present between concentric lamellæ. Numerous osseous deposits were seen without definite order. Coplin (personal communication. Dr. W. W. Keen.) described the tissue removed from Keen's case, and since it has not as yet appeared in the literature, I include it here.

Microscopic examination of the section stained with hæmatoxylin and eosin. Histological structure corresponds to that of the bone showing the Haversian, interstitial and circumferential lamellæ. Here and there in the lacunæ, bone corpuscles are found. The marrow is composed of an interstitial framework of connective tissue, in the meshes of which are found the various marrow cells. The periosteum is also seen. There is no pathological change of the tissue.

Horsley examined the tissue from two of his cases, one of which I have included as a typical case, and his report is as follows:

The outer, rather harder, portion of the bony mass consisted of normal trabeculæ of bone separated by unusually wide medullary spaces. The lamellæ in the bony trabeculæ were well marked but homogeneous throughout from the margins of the medullary spaces inwards.

In this region the medullary spaces were filled with a delicate, almost myxomatous, connective tissue, in the meshes of which hardly any characteristic medullary corpuscles appeared except at the periphery of each space, where a complete row of osteoblasts was present in most cases.

The central, softer, and more friable portions of the tumor presented very different appearances from the foregoing. The medullary spaces were very large, the bony trabeculæ in course of active absorption, and the medullary tissue replaced by a neoplastic fibrous growth. To consider these changes in further detail, the alteration in the marrow may be taken most conveniently first in order.

The medullary tissue of the outer portions of the tumor has already been stated to consist chiefly of a delicate fibrous tissue. From this condition to one in which the whole medulla was converted into a dense feltwork of fibrous reticular substance, every stage could be found.

In the progress of the metamorphosis the individual fibres appeared to become thickened and to take a brownish-red stain with hæmatoxylin. While in the extreme stages the greatly thickened fibres assumed a more granular appearance, the whole suggesting an osteogenic condition. Soon after the fibres became denser the osteoblasts disappeared, and their place was taken by osteoclasts.

The bony trabeculæ, as soon as the medullary tissue became obviously altered, showed notable changes, until in the most advanced areas of disease the bony trabeculæ exhibited change in the staining reaction (deeper color) and morphological alteration of the cells, a marked reversion to a chondroid stage, and furthermore the margins and surfaces of the trabeculæ displayed many false Howslip's lacunæ.

Dr. Goldsmith reported upon the tissue removed from my own case, as follows:

The tissues were decalcified in a solution of nitric acid and phloroglucin, imbedded in paraffin, and stained with hæmatoxylin and eosin.

The small pieces of material received consisted almost entirely of compact bone, which was so dense as

Fig. 3. Photograph of the skull in the Harvard Medical Museum. The foramina cannot be seen but Wm. F. Whitney, by whose courtesy the photograph was received, states that they are not reduced in size.

to require prolonged decalcification, which materially diminished the staining properties of the tissue.

The Haversian lamellae, as well as some of the interstitial lamellæ, are well marked. The lacunæ and many of the canaliculi are distinct. A great many bone corpuscles are readily seen, although poorly stained.

Osteoblasts and osteoclasts are not recognized.

On the whole, one is impressed with the great density of the bone.

After this *résumé* of the histological findings, we see that the assumption of Le Dentu of a relation between this disease and sarcoma cannot be substantiated. Moreover, the long course of the disease, the localization at times to particular bones, and again, the symmetrical involvement of others, cannot be harmonized with the well-known characteristics of malignant growths. Therefore, the chance similarity of certain cells should not lead us astray. The association of sarcoma with leontiasis ossea, however, is an extremely interesting question. It has arisen in a few cases apparently as a separate process.

In its relation to trophic disease, we have not as yet sufficient data to make authoritative statements. The border line between acromegaly and leontiasis ossea has already been touched upon. These two, however, must be considered in connection with von Recklinghausen's disease, since leontiasis ossea seems to lie between the two; some cases appearing to bear a close relation to the former and others to the latter, as already mentioned. It is probable, therefore, that a trophic origin will ultimately be assigned to the disease. In this relation we note in the atypical cases, that Bickersteth's case presented all the typical findings of leontiasis ossea, except that the hyoid and fibula were enlarged. Ilg's case was associated with changes in the vertebral column and lower extremities. On the other hand, Lanz describes his case as "Leontiasis Ossea mit generalisirten Fibroma Molluscum." While Heath's case showed a marked involvement of the superior and inferior maxillae upon one side, with extensive involvement of the soft parts, Scheick's showed distinct enlargement of the superior maxilla and zygomatic arch on one side, with enlargement of the soft parts. The other cases noted as resembling von Recklinghausen's disease had less bony involvement and more of the hypertrophy of the soft parts, at times with pigmented areas on the skin.

THE FINDINGS IN THE THIRTY-FOUR SO-CALLED TYPICAL CASES

Age. The age of onset showed a predilection for the early years of life. In 28 cases in which this could be found, 9 were congenital or began in early childhood, 12 became noticeable in the second decade, 3 in the third, and 4 later, the latest of these being noted at 64.

Sex. In 16 cases there were 9 males and 7 females.

Previous and Associated Disease. In no case is syphilis admitted, and in six it is specifically denied. No disease or traumatism is constantly present.

Region Involved. The involvement of the bones of the face and cranium is so irregular that any exact classification is impossible, since we will often find marked involvement of

Fig. 4. Photograph of the base of the hemisection of the skull described by Stack (skull 3). Furnished by Dr. Stack, who states in a personal communication that the foramina are not reduced in size. These can be seen in the photograph.

Fig. 5. Photograph of patient, M. Z. Referred by Dr. Boddiger. Notice the projection of the superior maxillæ outside of the eyes and the width of the nose.

certain parts and only slight of others. However, a general division of the cases can be made into: 1. Isolated bones involved. 2. Hemihypertrophy of the face and skull. These cases are always most marked in the anterior portion. 3. Bilateral involvement of certain bones. 4. Involvement of the entire face and skull. In these cases the inferior maxilla is frequently uninvolved or not mentioned.

For the purpose of study, we have here the reports of the 34 typical cases, and 9 skulls in which no history is extant. Of these 43 cases, 5 should be placed in Class 1 with isolated involvement as follows: case 3, left frontal; case 4, right frontal; case 11, left frontal; case 16, cranium, especially occipital bone; case 18, especially calvarium.

In Class 2, we find 4 cases; case 5, right half of face, including inferior maxilla; case 10, side not stated, but including anterior part of parietal; case 12, left side, especially the zygoma and including the inferior maxilla; case 29, while hypertrophy was much greater upon the left side, it was general and has been included in Class 4; case 31, left side of face.

By far the largest number of cases showed bilateral involvement of certain bones, Class 3. The bilateral involvement of the superior maxillæ was most common. The frontals, however, were frequently involved, either associated with the superior maxillæ or alone. In fact, so often was more or less involvement of most of the facial bones found, that a special subtype of general facial involvement might have some justification, did it not lead to confusion. Twenty-two cases, including skulls unaccompanied by clinical histories, can be found in this class.

The involvement of the entire cranium and face, Class 4, was found in 10 cases — 5 of these, however, were skulls unaccompanied by clinical histories, and here, of course, some doubt as to the diagnosis is justifiable.

The variability of the involvement is thus shown. In very few of the cases were the same bones involved to the same degree. As a sequence of the growth in the different areas, certain conditions and symptoms were prone to develop. The fossæ became obliterated, nerve and vascular foramina encroached upon, while in some cases, cerebral compression was noted. This subject will be taken up more in detail in the discussion of surgical treatment but a *résumé* of the findings in the 34 typical cases is given here.

THE NASAL FOSSÆ

In those cases in which the superior maxilla was involved, and statement made as to the condition found, 10 showed the nasal fossæ closed, while Gunn's and Young's cases, and my own, showed anosmia, and Ribel's case and my own had continual discharge. The antrum of Highmore was mentioned as being partly or completely obliterated at times. It is probable that these were involved in more of the cases and no notice taken of the fact. Anosmia was undoubtedly common, and infection of the antrum not infrequent.

INVOLVEMENT OF THE NERVE BRANCHES

Neuralgic pains in the face early in the course were noted in 11 cases. In Putnam's case the teeth were extracted by a dentist in hope of relieving pain.

Ear. Impaired hearing was found in 4 cases. In Stack's case of generalized enlargement, the hearing was normal.

Tear Duct. Epiphora was present in 4 cases and dacryocystitis in 3.

Eye. In 15 cases the orbital cavities were so encroached upon as to produce proptosis. In 10 of these same cases a varying degree of optic neuritis was present. In 2 it was noted as being absent, and in 2 no mention was made as to impaired vision or ocular findings — neither of the latter was mentioned in any case in which proptosis was absent. This fact is worthy of consideration when we come to study the operative treatment.

SYMPTOMS POSSIBLY DUE TO CEREBRAL COMPRESSION

In 15 cases symptoms which could be attributed to cerebral compression were present: 4 showed convulsions; 4, mental impairment even to dementia; 9, complained of headaches; 1, impaired gait; 1, dizziness; and 2 died with convulsions and coma. These will be discussed later. It is interesting to note that in only 4 of these was mention made of eye symptoms — suggesting that the optic neuritis may be as much due to the local changes in the orbital cavities as to the cerebral pressure.

COURSE

The development of the disease is always slow and it may apparently become arrested at any stage. Howslip's case died after having the disease 14 years, Stack's after 20, and Ribel's after 40. Many of the other cases reported while the patient was still living had been observed a number of years before the report; as, for instance, Haenkel's, 13; Putnam's, 9 and 15; Schiller's, 30; Horsley's, 17; Poisson's, 24; my own, 10.

TREATMENT

Until more authoritative statements can be made as to the ætiology, it is evident that no operative treatment can be undertaken with hope of cure. Attention is naturally focused upon the pituitary body. The reports, however, are too meager to be of any value. Stack's case showed that the pituitary fossa was partly obliterated, and he states that the gland was normal, but apparently no microscopic examination was made. Sattler's case also lacked a microscopic examination; he states, however, that, although the gland was enlarged, it presented no gross lesion.

The question as to the advisability of palliative operations has been neglected by surgeons, but after studying the histories, I believe it is worthy of careful consideration, and that in certain cases much benefit can be promised. Reference to the symptoms and signs classified in the 34 cases demonstrates that the most serious sequelæ appear in consequence of contraction of the nasal fossæ, the orbital cavities, and the cranium. The long course of the disease, and its arrest at certain stages, offers hope that if these complications can be removed, the patient's life and general health may be preserved for a number of years, and in cases of arrest, permanent relief from symptoms may be hoped for.

RELIEF FROM CEREBRAL COMPRESSION

Owing to the importance of this question, it will be studied in some detail.

As before mentioned, 15 cases showed symptoms that could be attributed to cerebral compression. But in no case was operation performed with the deliberate intention of relieving it. The first case of Horsley (case 1) was observed when the patient was 19 years of age, and he had complained of headache, with vomiting and epileptic fits, for 5 years; there is no history of optic neuritis. The swelling involved the left eyebrow most, but extended to the left parietal and occipital region. The right temporal and parietal bones were distinctly involved. The growth projected into the orbits and pushed the eyes downwards. Here was a case in which decompressive operation could undoubtedly have been done with hope of relief, and Horsley himself states that it should have been undertaken. In Horsley's fourth case (case 3), he had an opportunity to operate upon a patient who complained of pain in both frontal regions. One year later the patient was well, except for pain over the right side. The operation is described in detail later.

Sattler's case (case 8) unfortunately showed no symptoms of cerebral compression except an optic neuritis, and owing to the distortion of the orbital cavities and proptosis this might have been construed as being due to the latter,

so that the diagnosis of cerebral compression, and the consequent necessity of decompressive operation would have been difficult to have arrived at. The patient was active and cheerful until the convulsive seizures and coma developed, which ended in death after the disease had been observed nine years. On post-mortem, compression of the brain was demonstrated. Operation would certainly seem to have been indicated upon the orbits and the condition found at operation might have demonstrated the necessity of further operative procedure of decompressive nature, if the possibility of such had been kept in mind by the surgeon. Keen's case will be mentioned later under the discussion of operation in the presence of eye signs.

Starr's patient (case 14) complained of numbness and impaired gait (no mention is made as to eye symptoms; all the bones of the skull and face were involved and the possibility of decompressive operation should be considered). The same should be said concerning Putnam's first case (case 17).

Putnam's second case (case 18) might have been operated upon with hope of relief. The history states that the patient had repeated convulsions and the mental condition was constantly growing worse. Headaches were frequent. The forehead was prominent with two broad exostoses or thickenings on the skull, 2½ inches across. The patient had an optic neuritis.

Prince's case (case 21) presented the same indication. This was admitted by Dr. Prince at the post-mortem, since owning to the simultaneous thickening of the orbital plate of the frontal and vertex, the frontal lobes were greatly compressed. Partial atrophy of the right optic nerve was present. There was some proptosis however.

Wrany's case (case 24) showed cerebral symptoms. The vascular and nerve canals were not contracted and it is probable that palliative operation would have given considerable relief to the symptoms and prolonged life.

Schutzenberger's case (case 25) stands as a conspicuous example of possible palliation by decompressive procedures. The patient came under observation because of cerebral symptoms; epilepsy, headache, and final dementia. On post-mortem, none of the foramina, except the left posterior jugular foramen, were contracted. The anterior portion of the skull particularly was involved.

Thus we see, that of the fifteen cases mentioned showing symptoms of cerebral compression, there is justification for assuming that palliative operation might have relieved the patients for years, and in nine of these there were symptoms which should have suggested the advisability of operation. Case 3 was operated upon by Horsley — not with the idea of cerebral decompression, however — while cases 18, 21, 24, and 25 were conspicuous examples of cases that could not only have been diagnosed, but also operated upon with every hope of success. With these probabilities before us, we naturally ask ourselves, Are there any complicating factors which might militate against a result? The involvement of the orbital and nasal fossæ will be studied later. The chief factor that should be considered, is the contracture of the foramina, since it is evident that if these be seriously encroached upon any operative results would be temporary, at best. For a consideration of these cases, a study of the skulls is essential. It must be remembered that many of the skulls have been found and studied because of their conspicuous changes, and consequently represent the most serious and generalized form; and again show the ultimate and not the earlier type of the disease in which operation would be done. The less conspicuous skulls have not been described in the literature. This is emphasized when we note that of the 34 clinical cases previously discussed, only 4 showed involvement of all the bones of the face and skull, while of the 23 skulls, 9 showed such extensive involvement. Furthermore, in several no mention is made as to the involvement of foramina. Let us consider the most serious class in which little encouragement can be found. In the 10 skulls without clinical histories, mention is made as to foramina as follows:

Jadelot (skull 7) says, "The carotid canals and the canals of the emissary veins are almost entirely obliterated, other nerve and vascular canals contracted."

Otto (skull 8), "Orifices and canals diminished, especially carotid and jugular."

Bojanus (skull 9), "Occipital, sphenoidal, jugular,

and auditory canals contracted, but carotid canals enlarged."

Vrolik (skull 10), "Orifices and foramina of skull contracted, especially the left jugular. Carotid canals, foramen ovale, and optic foramina much contracted."

Gaddi (skull 11), "Showed general contraction of the foramina."

Thus we see that these skulls, remarkable for their size and the great progress of the disease, showed a general tendency to contracture. The skull of Jadelot weighed 3,913 gms., that of Vrolik 4,000 gms. without the inferior maxilla. Therefore, it cannot be denied that in the most complete type of the disease, the foramina are contracted. These skulls, however, as already pointed out, are uncommon and represent the terminal stage of the disease. For the purpose of study, the skulls accompanied by clinical histories present a fairer basis for study.

Sattler's case (skull 2, case 8), "The foramina were not contracted, neither the optic nor the others."

Stack's case (skull 3, case 9), "The foramina were not reduced in size." Prince's case (skull 5, case 21), "There was no change in the foramina." Putnam's report of skull in Harvard Museum, "This case has not been included in the clinical histories, since nothing is known except that the patient died at the age of 60, with a history of gradually enlarging head and diminishing mental faculties. In this skull the canals and apertures have not been encroached upon."[2] Putnam's case (skull 4, case 17), "The report states that the Fallopian canals were closed, likewise the openings in the cribriform plate of the ethmoid. The edges of the other apertures were thickened and rounded except where eroded by caries; the vascular grooves were practically obliterated."

Wrany's skull (skull 14, case 24), "All the vascular and nerve canals surrounded by excrescences but not contracted. Nerve and vascular canals of facial bones enlarged rather than contracted."

Schutzenberger's skull (skull 15, case 25), "None of the foramina were diminished in size, except the left posterior jugular foramen, this was only a small crack."

We see by a study of these skulls, obtained from subjects studied during life, that 5 out of the 7 showed little or no contraction of the foramina, while in the two that were involved (Putnam and Schultzenberger) the obstruction was not complete. By refering to the previous consideration of cases showing cerebral symptoms, including the skull in the Harvard Museum just mentioned, we note that symptoms of cerebral compression were present in 5 of these 7 cases, and Sattler's case had the compression without definite symptoms. Of these 6 cases, 4 showed no complicating contracture of the foramina, hence the decompressive operation would have given relief in all probability, and in the other two, it is by no means proved that it would not have ameliorated the symptoms. These patient's lived a number of years after the onset of the disease.

Thus we can say, that in at least one half of the cases showing cerebral involvement, operation was not only feasible but imperatively demanded. With these facts before us, it cannot be denied that we have strong justification for the belief that decompressive operations in a majority of cases of involvement offer hope of relief, and may preserve the cerebral functions for years.

What is the relation of the disease to the optic neuritis? A study of the cases showing this complication seems to demonstrate that it may be either a result of the cerebral compression or changes in the orbital cavity. It is interesting to note, as previously mentioned, that of the 15 cases showing cerebral symptoms, in only 4 is mention made of optic neuritis, although it may have been overlooked. We may find that proptosis, with orbital contraction, may explain its relatively greater frequency in the latter condition — 10 times in 15 cases. The probability is, however, that either condition may produce the lesion and our operative interference should include the orbital cavity. In relation to optic neuritis and the stage at which some sight may be preserved, the following statements by Horsley should be quoted:[3]

We learnt by a few years of operative surgical experience, that, whatever other factors might be concomitant, the most important one in the production of optic neuritis was increase of the intracranial tension. Therefore, it is now possible to dogmatize on this question, and to say that in no case of optic neuritis (not, of course, of toxæmic or anæmic origin) should the process be allowed to continue after it has once been diagnosed, and that if blindness results therefrom, the responsibility is very heavy on anyone who fails to advise such a simple proceeding as opening the dura mater.

As regards the procedure to be adopted, my own experience is that, although in rare instances the neuritis may begin to subside after even the first stage of only opening the skull, it is, as a rule, necessary to make a free opening in the dura mater to effect this purpose. One reservation must be made, that in cases where the tumor directly involves the optic tract, the specially delicate anatomical structure of the optic tract may negative the attaining of this otherwise invariable result.

In predicting what will be the condition of vision after surgical treatment of the optic neuritis, every-

[2] This is corroborated by a personal communication from Wm. F. Whitney of the museum.

[3] British Med. Jr., 1906, p. 411.

thing depends upon the care with which the ophthalmoscopic appearances of the disc are interpreted. Yellowish-white stippling, patches of exudation, or opal-white atrophic changes, especially when associated with macular figures, all indicate that the secondary changes in the disc are likely to be permanent and therefore, in proportion to their development, so the vision will be impaired; whereas, when the loss of vision has been dependent simply on the swelling of the disc, then not only is the sight saved but largely improved.

The technique of decompressive operations is so well known that I shall not discuss it here.

INTERVENTION IN CASES OF CONTRACTION OF THE ORBITAL CAVITIES

The discussion of this phase of the question is of great interest, since definite results can be promised. 17 of the 34 cases showed involvement of the orbital cavities. Putnam's cases (3 and 4), Astley Cooper's case, and Stack's cases (cases 9, 19, 20, and 27) showed some thickening of the orbit but no demonstrable change in the eye or its function. In the remaining 13, the information as to the optic neuritis is often indefinite; description, however, is as follows:

Horsley (case 1). Eyes pushed downwards.

Horsley (case 2). Proptosis of right eye; no diplopia; right eye has only perception of light, and left impaired vision.

Horsley (case 4). Right eye depressed and somewhat protruded, no diplopia, no change in fundus.

Sattler (case 8). Epiphora at the age of eleven, proptosis of both eyes at the age of fifteen, and optic atrophy in the left at nineteen, most marked in the left.

Keen (case 11). Eyes pushed downwards and forwards, no optic neuritis present. This case was operated upon and will be discussed later.

Gunn (case 15). Proptosis, optic disc atrophied.

Putnam (case 18). Eyes prominent; optic neuritis of right eye. Eyesight failed years afterwards.

Prince (case 21). Eyes prominent; orbital cavities diminished in size, and partial optic atrophy in right.

Edes (case 22). Eyes somewhat prominent; double optic atrophy.

Ribel (case 23). Proptosis after 30.

Howslip (case 28). Proptosis and impaired vision.

Thus we see that involvement of the orbits is an early and progressive change. The eyes are pushed out by the increasing bony deposit, and the frequent association of optic neuritis and displacement of the eyes leads us to consider this as of as much importance in the production of blindness as the cerebral compression.

When we consider the anatomy of the orbit and the relations of its vessels and nerves, we see that a considerable portion can be removed from the outer part and roof, giving relief to the contracted orbit. The removal of bone can be continued over to the optic foramen, releasing the optic nerve and artery if they be compressed. In two cases isolated hypertrophic bone has been removed, incidentally relieving the eye, although that may not have been the primary object of the operation. As long as the patients have been observed, however, no eye symptoms have developed.

Horsley's case (case 4) showed the right eye depressed one half inch and somewhat protruded. There was no optic neuritis, however, although there was impaired vision, and the operation doubtless prevented changes for years at least. The tumor involved the whole frontal region on the right side. He describes the operation as follows:

On April 24, 1895, the tumor was fully exposed by an incision beginning above, near the coronal suture and passing down to near the root of the nose, outwards along the margin of the orbit and zygoma. The flap was raised, and the periosteum scraped off the bone and cut away. The surface of the tumor was smooth and the bone vascular. Two discs of the bone were removed by the trephine at the inner and outer limits of the disease; it was outlined by a saw cut, and removed with forceps. It was softer than normal, the thickest part being at the margin of the orbit, where it measured fully one and a quarter inches, the frontal sinus being obliterated by it. The roof of the orbit was much thickened, and was removed as far back as the sphenoidal fissure; on the outer side, the major part of the great wing of the sphenoid and the upper part of the malar bone were cut away, and at the posterior part of the orbit the small wing of the sphenoid was also cut away, laying bare the optic nerve in its sheath and the structures passing through the sphenoidal fissure; the dura mater covering the anterior part of the frontal and temporo-sphenoidal lobes was exposed,

a small perforation made in it at one spot being closed by a horse-hair suture.

The flap was replaced and sutured, a small drainage tube was inserted at the outer angle; this was removed on the third day, and the wound was healed by the 13th day, when the patient was allowed to sit up. The hemorrhage was not severe, and the shock was very slight, considering the extent of the operation. No further pain has been complained of.

In a personal communication, Dr. W. W. Keen reports that in his case (case 11), the sight of the left eye was interfered with somewhat, the eyeball being pushed downwards and forwards nearly half an inch; eye grounds were normal. He reports the operation as follows:

Operation, November 16, 1898. I made an incision over three sides of a square extending from just above the eyebrow upward, and from near the middle line to the temporal fossa. I then trephined just above and to the left of the root of the nose, intending to trephine at the four corners and with the Gigli saw to throw back an osteoplastic flap. I found the bone at this point a scant inch and a half in thickness. The bone was very soft and could be easily gouged away. I very soon found that it was a case of leontiasis ossea, with pressure on the brain. Accordingly, I removed most of the left half of the frontal bone, and then drew down the soft parts so as to get into the roof of the orbit. Finding no osseous prominence there, I closed the wound with iodoform-gauze. Later, I may possibly put in a piece of celluloid. The specimen was sent to Dr. Coplin, No. 499.

She made an uninterrupted recovery, the temperature rising only once to 100°.

Second Operation, January 25, 1899. The same flap was lifted upward, the lower margin turned down, and the projecting bone of the supra-orbital region was partly gnawed away with rongeur forceps. On trying, I found I could cut it away with an ordinary scalpel, so soft was the bone. A celluloid plate 1.8 mm. in thickness was then inserted. Its margins were filed off so as to produce no prominence and a half-dozen holes were bored through it to allow the escape of any blood from underneath. This was simply laid *in situ* without attempting to fasten it in any way. The arch over the orbit formed a shelf on which it could rest. Some of the thickened bone in the roof of the orbit was then gouged away. The wound was closed with a piece of iodoform-gauze for drainage.

She made an uninterrupted recovery, her temperature only once exceeding 99°. She was discharged on the 10th day, having been delayed there for four days on account of a severe storm.

June 22, 1903. She called to see me to-day. She weighs 102 pounds, has been menstruating regularly for the last six months. On examining her head, I find the plate of celluloid firmly fixed so that it cannot be displaced by manipulation through the skin. There is no recurrence of the leontiasis.

The study of the other cases previously classified demonstrates that operative procedure could have been instituted in like manner. In Sattler's case, for instance, proptosis developed at the age of 15, while optic atrophy did not appear until 19. Displacement practically always precedes the destruction of the nerve, and offers a clear indication for operation with every hope of preserving the function of the eye. Horsley himself states that his first case (case 1) should have been operated upon. It is possible that in cases of extensive involvement, operation in stages may be indicated.

Involvement of the Nasal Fossæ

This complication is undoubtedly present much oftener than the histories show. While it is not so serious as the preceding sequelæ, yet the patients often complain bitterly of the nasal obstruction and continual discharge which the obstruction produces. Anosmia while probably frequently present would be seldom complained of by the patient. The involvement of the tear duct is a more serious disaster, for which intervention could probably offer slight hope of relief. Epiphora was noted in 4 cases and dacryocystitis in 3, this generally being one of the early signs of the disease. In those cases in which the nasal obstruction is complete, the relief and satisfaction to the patient is marked, as was demonstrated in my case, where complete anosmia was demonstrated by Dr. Kahn and obliteration of both fossæ was present, with a constant purulent discharge. I do not believe that the antrum of Highmore was involved. The enlargement was so great as to have led earlier observers to diagnose bilateral osteomas. Under complete anæsthesia the bony deposits on both sides were chiseled out, giving a free ingress to air. After some weeks of local treatment by Dr. Boddiger, who referred the case to me, the nasal discharge has ceased, and the patient makes no complaint except that he has some earache, whether due to local irritation or involvement of nerves in bony deposit is still open to question. From a study of the cases it would seem that cases 2, 13, 23, 26, 27, and 28 might also have been relieved in like manner. The permanence of the relief depends, of course, upon the rapidity

of growth. In my case the bone had been growing for ten years at least; seven years previously, he had complained of dacryocystitis; so that there is every possibility that some years may elapse before a second operation is indicated.

Other operative attempts to relieve the neuralgia, prevent growth, and relieve deformity have been made as follows: Horsley (case 2) operated to determine whether the branches of the middle division of the 5th nerve were involved. He describes his exploratory operation as follows.

> On January 6, 1892, an incision was made along the lower margin of the orbit and vertically down the side of the nose to the ala; the bony growth was exposed and found to involve the anterior surface of the maxilla, extending round the margin of it into the orbit as far back as the spheno-maxillary fissure, where it rose half an inch above the floor of the orbit. Before the operation was undertaken, the patient would not entertain the idea of excision of the jaw, and as it was evident that the only treatment that would benefit him was its extirpation, which could not be done without his consent, the flap was replaced and sutured in position with horse-hair.

This patient had been operated upon five years previously by Dr. Bland Sutton, and notes of the case were published in the *Transactions of the Clinical Society* (vol. xxii). The right lower jaw was removed at the first operation, and three weeks later the right upper jaw.

Putnam suggested in 1896 what had already been attempted by Barwell in 1881, namely, the ligation of the blood supply. He tied the common carotid artery just above the sterno-clavicular joint. The patient died of secondary hemorrhage seven days afterwards.

Poisson's patient had enlargement of the malar, frontal, and superior maxilla of one side. After making an incision along the side of the nose, raising a flap of skin and periosteum, he chiseled away the excessive growth, thus restoring the face to its original shape. In this patient the disease began at the age of 16, and the operation was performed at the age of 42.

Le Dentu has performed a like operation.

SUMMARY

1. Operative procedures are justifiable in a certain proportion of the cases.

2. No well-defined operation can be suggested as a curative measure. The pituitary body has been observed enlarged in only one case, and there microscopic examination is lacking. Further careful examination should be made when opportunity presents itself.

3. Palliative operations should be done to relieve cerebral compression, and encroachment upon the orbital and nasal cavities. The indication for these procedures is clear; the diagnosis can be made, and relief from symptoms, with the preservation of sight and mentality for years can be expected.

4. Obstruction of the blood supply and operations for cosmetic purposes may be considered.

5. The relationship between acromegaly, von Recklinghausen's disease, and generalized trophic changes in bones, on the one hand, and so-called leontiasis ossea, on the other, cannot be stated at the present time; therefore, the latter should not as yet be classified as a pathological entity, although its clinical individuality should be retained.

REPORT OF TYPICAL CASES

CASE 1. Horsley, *The Practitioner*, London, 1895, lv, pp. 12–25. *Age:* Began at 15, observed at 19. *Sex:* Male. *Previous Disease:* Denies syphilis or traumatism. *Region Involved:* Swelling began over left eye. On entrance the swelling of the cranial bones affected the left eyebrow most prominently, but extended to left parietal and occipital by continuity. Otherwise normal, except right temporal and parietal bones distinctly involved. Growth projected into both orbits, pushing eyes downwards. Inferior maxilla not enlarged. *Nasal Fossa:* Not involved. *Fifth Nerve Symptoms:* Pain early over left forehead. *Ear:* Deaf in right ear. *Eyes:* Eyes pushed downwards. *Cranial Symptoms:* Headache with vomiting. Epileptic fits for five years, i. e., since 14.

CASE 2. Horsley, *The Practitioner*, London, 1895, lv, pp. 12–25. *Age:* Began at 20, and was observed at 25 by Bland Sutton, and at 28 by Horsley. *Sex:* Male. *Previous Disease:* Denies syphilis or traumatism. *Region Involved: Sutton:* Began as exostosis on each side of nose and then ramus of jaw on right side became involved. Right inferior maxilla involved. *Horsley:* Left side of face involved. Inner half of floor of orbit involved. *Nasal Fossa: Sutton:* Right nostril completely closed. Right antrum completely obliterated. *Fifth Nerve Symptoms: Horsley:* Neuralgia left side of face. *Eye: Sutton:* Right eye slightly protruded. No diplopia. Both discs pale and white. Right most advanced. *Horsley:* Right only perception of light. Left impaired vision. Left eye

most protruded. *Tear Duct, Sutton:* Epiphora. *Horsley:* No left epiphora. *Operation, Sutton:* Right upper and lower jaws removed in two sittings. *Horsley:* Exploratory incision to see if nerves could be released to relieve pain; could not. In spite of operation, sight of right eye was lost.

CASE 3. Horsley, *The Practitioner*, London, 1895, lv, pp. 12–25. *Age:* Began at 12, observed at 13. *Sex:* Female. *Previous Disease:* Denies syphilis or traumatism. *Region involved:* Left frontal region of orbit at outer part but not orbital plate. Extended to temporal ridge and hairy scalp. *Nasal Fossa:* No obstruction to left. *Cranial Symptoms:* Pain in both frontal regions. *Operation:* Incision along eyebrow back to level of external auditory meatus. Bone and periosteum removed, including the whole breadth of the roof of the orbit in its anterior two-third. One year later patient was well except for pain over right side.

CASE 4. Horsley, *The Practitioner*, London, 1895, lv, pp. 12–25. *Age:* Began at 18, observed at 35. *Sex:* Male. *Previous Disease:* Denies syphilis or traumatism. *Region Involved:* Right side of forehead and frontal region going to temporal crest. Orbital margin most thickened. Frontal sinus obliterated. *Fifth Nerve:* Neuralgia; relieved after operation. *Eye Symptoms:* Right eye depressed and somewhat protruded. No diplopia. No change in fundus. *Operation:* All involved bone removed. Roof of orbit removed as far back as the sphenoidal fissure; a major portion of the great wing of the sphenoidal and malar were removed, and at the posterior part of the orbit, the small wing of the sphenoid was cut away, laying bare the optic nerve and structures in the sphenoidal fissure. No further pain complained of.

CASE 5. Barwell, *Transaction of the Pathological Society of London*, vol. xxxii, 1880–1881, pp. 282–284. *Age:* Began at birth, observed at 7. Case not well observed but is accompanied by photograph showing hypertrophy of right half of face, particularly inferior maxilla. *Sex:* Male. *Operation:* Barwell ligated common carotid artery just above sternoclavicular joint. Patient died of secondary hemorrhage.

CASE 6. Young, *British Medical Journal*, 1896, 2, p. 1303. *Age:* Began at 39, observed at 46. *Region involved:* Both superior maxillæ, both frontals, orbital cavities diminished. *Eyes:* Vision weak, proptosis. *Nasal Fossa:* Anosmia.

CASE 7. Ziehl, *Archiv für Pathologische Anatomie*, Berlin, 1883, xci, pp. 92–105. *Age:* Began at birth, observed at 4. *Region involved:* Hypertrophy of superior and inferior maxillæ encroaching on eye and nose. Skull not involved. Soft tissues take part in process.

CASE 8. Sattler, *Transactions American Ophthalmic Society*, Hartford, 1900–1902, ix, p. 59. *Age:* Began at 11, observed at 20. *Sex:* Female. *Region involved:* Started in superior maxilla, especially left side involved. *Post-mortem:* Calvarium thickened, brain compressed, and the superficial veins prominent and varicose. The sella turcica very deep. The pituitary gland enlarged, but no gross lesion. The orbital plates of frontal bone both much thickened. Sinuses filled. Foramina not contracted. *Eyes:* Epiphora at age of 11. Proptosis of both eyes, most marked in left, at the age of 15. Optic atrophy at 19, most marked in left. *Cerebral Symptoms:* Attack resulting in death came on with convulsive seizures and coma, due to hemorrhage at base of brain. Age 21. She was active and cheerful until that time. *Tear Duct:* Epiphora at the age of 11. *Blood-Vessels:* Superficial on brain prominent, foramina not contracted. *Pituitary Gland:* Enlarged, but no gross lesion.

CASE 9. Stack, *Bristol Medical Chirurgical Journal*, 1900, xviii, pp. 316–320. *Age:* Began before 7, observed at 21. *Length*: Till death — 20 years. *Region Involved*: Entire skull and head enlarged uniformly. Early diagnosis of hydrocephalus. Foramina not reduced in size. Base of skull interiorly nearly normal. Naso-pharynx contained a firm, white bony body, distinct from the other lesions. Sarcoma. Inferior maxilla involved. Weight one pound. Lower jaw began same time as head. Some softening of bones of pelvis suggesting osteomalacia. *Nasal Fossa:* Smell normal. *Ear:* Hearing normal. *Eyes:* Eyes not displaced downwards and forwards. Sight normal, orbits contracted vertically and horizontally. *Tear Duct:* Dacryocystitis at 12 years. "Probe could not be inserted because of abnormality of nasal bones." *Pituitary Gland:* Pituitary fossa partly obliterated. Pituitary body normal. The bones of the skull on section were for the most part softer than natural, but the appearance was not quite homogenous. In parts there were masses of more compact tissue, and in others, the rarefaction had proceeded to such an extent as to leave spaces of an eighth of an inch in diameter.

CASE 10. Chiene, *Edinburgh Medical Journal*, 1894–5 xi, p. 346. *Age:* 24 years. *Sex:* Male. *Region Involved:* Enlargement of superior maxilla, nasal, frontal, malar, and anterior part of the parietal. No difference in skin. Inferior maxilla not enlarged. *Fifth Nerve:* Pain over superior maxilla, which ceased under 10 grains of potassium iodide. *Blood-vessels:* Temporal arteries more tortuous than on opposite side. Nothing to suggest acromegaly, achondroplasia, or osteitis deformans. *Microscopical:* Liver contained nodules size of marbles, which were thought to be syphilitic, but not sure.

CASE 11. Keen, *International Clinics*, Philadelphia, July 1899, p. 180, and personal communication. *Age:* Not stated. Probably congenital, observed at 11. *Sex:* Female. *Region Involved:* Frontal region. Diagnosis of tumor of frontal region was made. *Eyes:* Eyeball pushed downwards and forwards. No optic neuritis present. *Cerebral Symptoms:* No epilepsy or headache. *Operation:* Child was supposed to have a brain tumor and was operated upon. Flaps of skin turned up, but upon trephining, the skull was found to be enormously thickened; it was soft and easily gnawed away with bone forceps, even shaved away by scalpel. Dura was exposed over considerable area and no necessity was found for interfering with the orbit. Bone was 3 cm. thick. At late operation, roof of orbit was gouged away and celluloid plate inserted.

Five years later, 1903, Dr. Keen reports that she is still well. No recurrence.

CASE 12. Hankel, *Berliner klinische Wochenschrift*, 1884, xxi, p. 560. *Age:* Began at 12, grew until he was 29, observed at 35. *Sex:* Male. *Previous Diseases:* Denies syphilis. *Region Involved:* Began left side of face, especially the zygoma. At 35 left side of face twice the size of right. Zygoma most involved. Left frontal and inferior maxilla larger than right. No skin changes.

CASE 13. Patel and Pellanda, *Lyon Médical*, 1905, cv, pp. 448–450. *Age:* Not stated, but had deformity long time. *Sex:* Male. *Previous Diseases:* Denies syphilis. *Region Involved:* Enlargement of all facial bones, especially frontal, sphenoidal, superior maxillæ. Left side of nose particularly deformed. Inferior maxillæ not particularly enlarged. *Nasal Fossa:* Contracted.

CASE 14. Allen Starr, *American Journal Medical Society*, December, 1894. *Age:* Observed at 52. *Sex:* Male. *Region Involved:* Both bony and soft tissues of head, face, and neck involved. Skin slightly pigmented. Bone is primarily and chiefly involved. Symmetrical. *Nasal Fossæ:* Obstructed partly. *Cerebral Symptoms:* Numbness and tingling in extremities. Gait impaired.

CASE 15. Gunn, *Lancet*, London, July 11, 1885, p. 67. *Age:* Observed at the age of 22. *Sex:* Female. *Region Involved:* Symmetrical enlargement of upper half of face. *Nasal Fossæ:* Anosmia. *Fifth Nerve:* Neuralgia for about eleven months. *Eyes:* Optic discs atrophied. Proptosis.

CASE 16. Hale, White, *British Medical Journal*, June 6, 1896, p. 1377. *Age:* Observed at the age of 32. *Sex:* Male. *Region Involved:* Bones of the face unaffected. Involved cranium particularly, especially occipital bone. *Eyes:* No symptoms.

CASE 17. (1) Putnam, *American Journal of Medical Sciences*, July, 1896. *Age:* Began at the age of 20 and observed at 29. *Sex:* Female. *Region Involved:* Broadening of head and prominence of eyes. Double facial paralysis. *Post-mortem:* Sutures not visible. Fallopian canals and cribriform plate-openings closed. *Ear:* Deafness, sero-purulent discharge from ears. *Cerebral Symptoms:* Pains in head, dizzy on walking.

CASE 18. (2) Putnam, *American Journal of Medical Sciences*. July, 1896. *Age:* Began at the age of 5. *Region Involved:* Forehead prominent. Two broad exostoses on skull 2½ inches across. *Fifth Nerve:* Neuritis. *Ear:* Deaf. *Eyes:* Right optic neuritis is slight. Eyes prominent. The eyesight failed years after. *Cerebral Symptoms:* Repeated convulsions in early years — one to two years of age; then none until thirteen, and at time of report afflicted with many. Headaches, poor mental condition, constantly getting worse.

CASE 19. (3) Putnam, *American Journal of Medical Sciences*, July, 1896. *Age:* Began at the age of 35 and observed at 50. *Region Involved:* Bones of face not enlarged, but edges of the orbit were thickened. *Fifth Nerve:* Neuralgic pains. *Ear:* Hearing poor for number of years. Abscess in both ears 15 years before. *Eyes:* Eyesight good. *Cerebral Symptoms:* Slight headaches.

CASE 20. (4) Putnam, *American Journal of Medical Sciences*, July, 1896. *Age:* Began at the age of 23 and observed at 35. *Sex:* Female. *Region Involved:* Began in left parietal eminence. Head enlarged in all directions. Longest circumference 65½ cm. *Fifth Nerve:* Burning sensation right side of face. *Eyes:* Eyes normal but orbital plates thickened. *Blood-Vessels:* Temporal veins distended. Teeth on right side were removed by dentist in hope of relieving pain.

CASE 21. Putnam reports case of Dr. Prince, *American Journal of Medical Sciences*, July, 1896. *Sex:* Male. *Region Involved:* Frontal bone prominent, one inch thick. Orbital plates greatly thickened, pushing bone upwards. *Eyes:* Partial atrophy of right optic nerve, orbital cavity diminished. Eyes prominent. *Compression Symptoms:* Mentality reduced.

CASE 22. Edes, *American Journal of Medical Sciences*, 1896, vol. cxii, p. 21. *Age:* Observed at the age of 52. *Region Involved:* Enlargement most marked in forehead, which is rounded. Temporal fossæ greatly filled out and rounded, giving bulbous overhanging look of hydrocephalus. *Eyes:* Double optic atrophy. Eyes somewhat prominent.

CASE 23. Ribel by Baumgarten, *Thèse pour le doctorat en medicine Paris*, No. 1892, p. 183. *Age:* Began at the age of 6 and observed at 46. Died at 46 from tuberculosis of the lungs. *Sex:* Male. *Region Involved:* Superior maxillæ became early involved. Between 20 and 30 orbits became contracted. Eyes later showed proptosis. No changes in cervical vertebræ. No statement as to apertures. Inferior maxilla showed slow growth. *Nasal Fossæ:* Nasal fossæ closed at the age of 15, continual discharge from nose. *Eyes:* Proptoses after 30. *Compression Symptoms:* No cerebral symptoms. No convulsions or paralysis. *Tear Duct:* Dacryocystitis at 12.

CASE 24. Wrany by Baumgarten. *Region Involved:* Anterior portion of cranium mostly involved. All the vascular and nerve canals surrounded by excrescences but not contracted. Began with the involvement of the inferior maxilla. *Compression Symptoms:* Cerebral symptoms present. *Tear Duct:* Right tear duct closed.

CASE 25. Schutzenberger by Baumgarten. *Age:* Observed at the age of 40. *Region Involved:* Contraction of left posterior-jugular foramen, others not at all. Thickening of all bones of face, especially frontal; venous engorgement of brain. *Cerebral Symptoms:* Patient came under observation because of epilepsy, headache, and final dementia.

CASE 26. Poisson, by Baumgarten. *Age:* Began at the age of 16 and observed at 42. *Sex:* Female. *Region Involved:* Diffuse hypertrophy of superior maxillæ, malar, frontal, zygoma, also involved. *Nasal Fossæ:* Entirely obliterated. *Operation:* Poisson made incision at the internal angle of the eye, along side of nose, raised flap of skin and periosteum, and

then chiseled away the excessive tumor, restoring the face to its original shape and size.

Case 27. Astley Cooper by Baumgarten. *Region Involved:* Double osteoma of the superior maxillæ. *Nasal Fossæ:* Cavities involved. *Eye:* Cavities involved. *Microscopic:* Microscopic examination made, indefinite.

Case 28. Howslip, by Baumgarten. *Age:* Began at the age of 45 and observed at 59. *Region Involved:* Superior maxillæ involved. *Nasal Fossæ:* Cavities obliterated. *Fifth Nerve:* Much pain in face. *Eyes:* Eyes pushed from sockets; vision impaired.

Case 29. Port, *Correspondenz-Blatt für Zahnärzte*, Berlin, 1904, xxxiii, pp. 193–8. *Age:* Began at childhood and observed at 20. *Sex:* Male. *Region Involved:* Both sides of face, especially the left. This side was much larger than the right — hypertrophy extended exactly to the median line, involving face, skull, and inferior maxilla. In this case, the increase of size of teeth on left side was particularly interesting. *Operation:* Piece of bone of inferior maxilla chiseled away.

Cases 30 and 31. Fisher, *Deutsche Zeitschrift für Chirurgie*, Bd. 12, p. 57, 1879. Reports briefly two cases. 1. A man 18 years of age. Tumor mass grew to size of child's fist. There were no symptoms of cerebral compression. 2. A woman of 30. Involvement of left orbit and left superior and left inferior maxilla. Blindness was present and the patient complained of headache.

Case 31. Abstract in Schmidt's *Jahrbücher*, 1834, No. 2, p. 384. Report of child who died at the age of 18 months, after having had convulsions at irregular periods since birth. At post-mortem the bones of the skull were found greatly thickened, but no involvement of the face,

Case 32. Schiller, *Münchener medicinischer Wochenschrift*, vol. xlviii, p. 1560, 1901. *Age:* Began *in utero*. Difficult extraction on account of growth of head. Reported at 30. Growth continued after birth. *Region Involved:* Irregular involvement of frontals, temporals, superior maxillæ, and parietals. Patient complained of headache. No other cerebral symptoms. *Eyes:* No proptosis. Fundus normal. *Nasal Fossæ:* Left nasal narrowed.

Case 33. Hinsdale, *Journal of Nervous and Mental Diseases*, vol. xxiii, p. 803, 1896. *Age:* Began at 64, died at 71. *Region Involved:* Calvarium. Face not involved. Skull wall varied from 18 to 35 mm. in thickness. No statements as to orbits or foramina. Cavity of skull of normal size. *Symptoms:* Previous to the onset of the disease the patient had been lively and intelligent, but became listless, and final dementia developed, with insomnia and coma.

Case 34. Personal observation. M. *Age:* 30. Pole, iron worker. Referred by Dr. Boddiger. *History:* The man noticed at 20 years of age that he could not breath through his nose. At the same time, he noticed that the superior maxillæ were larger than normal. At the age of 23, there was an infection at the right inner canthus, and an abscess developed (dacryocystitis). Between the ages of 21 and 24 he had headache constantly, but since then it has not been severe. He did not suffer from epilepsy, had no trouble with his eyesight, and his hearing was normal. At the age of 29, there was a discharge of pus from the right side of the nose. Shortly afterwards the left side began to discharge pus. Neuralgic pains over the superior maxillæ were marked up to 3 years ago, i.e. between the ages of 21 and 27 years. The teeth are somewhat loose in the upper alveolar process.

Examination: The patient presents the appearance of excessive development of the superior maxillæ, especially marked on the right side. The cranium does not seem enlarged. There is possibly some enlargement of the ascending rami of the inferior maxilla. Other bones of the body seem normal. The eyes appear normal, and there is no bulging or apparent growth of frontal or orbital plate of frontal.

Dr. Harry Kahn, who examined the patient for me, reports as follows upon examination of the ear and nose. *Ear:* The membrana typani normal, as are the other parts that may be examined otoscopically. The hearing is normal except that there is a slight reduction of the perception of the high tones (C 4). *Nose:* Anterior rhinoscopy. Both the right and left sides are occluded, except a narrow slit between the septum and the lateral wall. The septum is straight. The left side; the outlines of the anterior end of the middle turbinate can be made out, the inferior turbinate appears to be fused with the floor of the nose, causing a projection from it and completely obliterating the inferior meatus. On the right side the cavity is narrower than on the left. No vestige of the middle turbinate can here be seen and the inferior turbinate, as on the opposite side, is also fused with the floor obliterating the inferior meatus. The color of the mucous membrane is altered, it is a greyish-pink and appears infiltrated and soggy. In both nostrils a small amount of white ill-smelling pus is present. On account of the condition which is present, it is not possible to say from where this pus comes. The posterior rhinoscopic picture shows a narrowed chonael opening on both sides, with no inferior turbinal visable, and only a large projecting mass in the place of the superior and middle turbinal bones. The vault of the naso-pharynx, especially the portion towards the left side, contains pus. Complete anosmia. *Pharynx:* Somewhat redder than normal and is dry and shiny. *Larynx:* Negative. The roof of the mouth (hard palate) is broad and arched with a tendency to the gothic. The rugæ are large and prominent.

Measurements:

Bi-superior maxillary diameter, 15 cm.

Bi-frontal diameter, 12 cm.

Mento-frontal diameter, 20½ cm.

Glabello-occipital diameter, 24½ cm.

Oblique diameter superior maxilla, left-mastoid, right, 16½ cm.

Oblique diameter superior maxilla, right-mastoid, left, 16½ cm.

Circumference cranium, around forehead, 58 cm.

Circumference occiput-superior maxilla, under nose and above ears, 61½ cm.

The right and left oblique diameters were 16½ cm., as shown above, which would seem to indicate a symmetrical involvement of the maxillæ. This is erroneous, however, and due to the irregularity of the face and base of the skull.

Operation: Under general anæsthesia, with a chisel and mallet, the bone obliterating the nasal fossæ was removed until the cavity was restored to its normal size, or even larger. The antra were not entered on either side, showing an extensive contraction of these, although they were apparently not obliterated, as was later shown by X-ray picture. The hemorrhage, although free, was not excessive. The anterior portion of the maxillæ on the inner side seems to be more extensively involved than the posterior, and the bone was not soft, as has been described in other cases, but was of ivory hardness. The bony tissue was decalcified with difficulty, and a microscopical examination made. The report of Dr. Goldsmith is included in the general discussion of the subject.

REPORT OF THE SKULLS

SKULL 1. Atypical. Case 17. *Transactions of Chicago Pathological Society*, vol. iii, pp. 231–240, 1901–3. *Region Involved:* Especially left side. Frontal, superior, and inferior maxillæ. Superior maxilla most marked. Base of skull greatly deformed. *Measurement:* Circumference 68 cm. Frontal bone 8.5 cm., thick. Remainder of skull 2 cm. to 8 mm. Left angle to symphysis 18 cm. Right angle to symphysis 13 cm. Length 25 cm. Lower end frontal suture to coronal suture. Right 5.7 cm. Left 8.5 cm. *Weight:* Skull cap 1450 grams.

SKULL 2. Sattler. Case 8. *Region Involved:* Started in superior maxilla. Left side especially involved. Calvarium thickened. The brain was much compressed and superficial veins prominent. Orbital plates of the frontal on both sides much thickened. Sinuses are filled with bone. *Pituitary Fossa:* The sella turcica was very deep. The pituitary gland much enlarged, but no gross lesion. *Foramina:* Not contracted, neither the optic nor others.

SKULL 3. Stack. Case 9. (See photograph.) *Region Involved:* The entire skull enlarged as well as the face and inferior maxilla. Interior of skull looked normal. Naso-pharynx contained fibro-sarcoma. Orbits contracted except in length. Bones of lower jaw had overgrown the teeth, so that some were entirely buried. *Measurements:* Weight 8½ pounds. Lower jaw weighed 1 pound. Bi-temporal 8¾ inches. From occipital protuberence to glabella 21½ inches. The circumference in the same region (bi-temporal) 31¼ inches. *Weight:* Skull cap 8½ pounds. *Foramina:* Not reduced in size. Case came from the Royal Infirmary, Bristol.

SKULL 4. Putnam. Case 17. *Region Involved:* Sutures not visible. Fallopian canals closed, likewise passages of the cribiform plate of the ethmoid. *Measurements:* Cavity not greatly diminished. *Foramina:* Fallopian canals closed, likewise cribiform plate of the ethmoid. Edges of other apertures thickened and rounded, except where eroded by caries. Vascular grooves practically obliterated.

SKULL 5. Prince's Case reported by Putnam. Case 21. *Region Involved:* Frontal bone prominent. Frontal bone 1-inch thick, compressing frontal portion of brain. Orbital cavity diminished. Involved both frontal bones almost exclusively. *Foramina:* No change.

SKULL 6. Baumgarten. Gaddi first described Malpighi, *Thèse pour le doctorat en Medicine*, 1892, p. 183. *Region Involved:* Bones of base much thickened. Cavities of eyes small. *Foramina:* No statement.

SKULL 7. Jadelot by Baumgarten. *Region Involved:* The superior and inferior maxillæ, the entire skull much increased in size. Obliteration of left auditory canal (deaf). Suborbital canal reduced in size. Nasal orifice diminished in size, also lachrymal canals. Sphenoidal cavity obliterated. *Weight:* Skull weighed 3913 grams, that is six times more than the ordinary head. *Foramina:* Carotid canals, involved canals of the emissary veins are almost entirely obliterated, optic canal contracted as well as other vascular and nerve canals.

SKULL 8. Otto by Baumgarten. *Region Involved:* The orbital cavities are small, sutures effaced. Lachrymal canals diminished, superior maxillæ greatly enlarged. Involvement greatest in anterior part. *Foramina:* Orifices and foramina diminished, especially carotid and jugular canals. Lachrymal canal diminished.

SKULL 9. Bojanus by Otto, by Baumgarten. *Weight:* Otto describes a skull found by Bojanus, without the inferior maxilla; it weighs 4000 grams. *Foramina:* The occipital foramen, the sphenoidal foramen, and the auditory canals are reduced. The carotid canals enlarged but the jugular canal is contracted. The mastoid foramina are enlarged.

SKULL 10. Vrolik by Baumgarten. *Region Involved:* Frontal bone most involved. Most of the changes are noted on the inside of the skull. *Foramina:* Orifices and foramina contracted. The sphenomaxillary fissure almost destroyed. Optic canal reduced to fissure.

SKULL 12. Cruveilheir by Baumgarten. *Region Involved:* The nasal fossæ completely obliterated; orbital openings much contracted. Lachrymal canal, maxillary, and sphenoid sinus, almost obliterated. Vomer four or five mm. in thickness. Especially marked about face. *Foramina:* No description of interior of skull.

SKULL 13. Peruvian Skull by Baumgarten. *Region Involved:* Nasal and orbital canals almost obliterated. Facial bones particularly involved and inferior maxilla involved.

SKULL 14. Wrany from Baumgarten, 1867. Case 24. *Region Involvod:* Hypertrophy most in anterior part of skull. Antrum of Highmore nearly obliterated. Trouble began in the inferior maxilla. *Foramina:* All the vascular and nerve canals surrounded by excrescences but not contracted. Nerve and vascular canals of facial bones enlarged rather than contracted.

SKULL 15. Schutzenberger from Baumgarten. Case 25. *Region Involved:* Thickening of all the bones of the face, especially the frontal. General osteosclerosis of the skull. Venous engorgement of the brain. *Foramina:* None of the foramina were diminished in size except the left posterior jugular foramen. This was only a small crack.

SKULL 16. Putnam. Harvard Medical Museum. Part of Spurtzheim Collection. (See photograph.) *Region Involved:* The face bones little involved. Skull bones markedly thickened 1 inch. Cavity of brain encroached upon. No history known, except that patient died at the age of 60. The skull had been gradually enlarged and mental faculties diminished in the same ratio. *Foramina:* In a personal communication Wm. F. Whitney of the Museum, reports as follows: "I have examined the foramina at the base of the skull, in comparison with those of a normal one, and should say that they are not diminished in size although the bone is in general thickened."

SKULL 17. Army. Medical Museum, Washington, D. C. Enlargement of all facial and cranial bones. (See photograph.) No history except that patient was a mulatto, and skull came from a dissecting room in Baltimore.

SKULL 18. Young. Case 6. Report very meager. *Region Involved:* Both superior maxillæ and frontals. Orbital cavities diminished. Base normal with no occlusion of foramina. Sella turcica normal. Pituitary gland normal in size.

SKULL 19. No clinical history. Fisher, *Deutsche Zeitschrift für Chirurgie*, Bd. 12, p. 59, 1879. *Region Involved:* Temporals, frontals, and zygoma especially on left side. Left inferior maxilla enlarged. Right normal. No statement as to foramina.

SKULL 20. No clinical history. Fisher v. s. Left frontal, parietal, and temporal bones. Orbits not involved. Cavity of skull only slightly narrowed. *Foramina:* No statement.

SKULL 21. Sommer, *Allgmeine Zeitschrift für Psychiatrie*, Bd. 54, p. 704, 1897. *Region Involved:* Chiefly great wing of sphenoid and orbit. It is questionable whether the brain was compressed, although the man was insane. No relation between the insanity and changes in the bones could be demonstrated. The region of the hypophysis was encroached upon. *Foramina:* Foramina on sphenoid contracted. Other in the base surrounded by excrescences.

SKULL 22. The short report of this skull is included in the Clinical History 31.

SKULL 23. Hinsdale (Case 33), calvarium alone involved, bone thickness 18–35 mm. No statements as to foramina or orbits. Cavity of skull not lessened.

ATYPICAL CASES

For the reasons mentioned in the text, I have arbitrarily classed as atypical the following cases:

CASE 1. HORSLEY (Case 2). The Practitioner, London, 1895, lv, pp. 12–25.

CASE 2. ZIEHL reports case already reported by Virchow. Archiv, 1863, vol. xxxviii, p. 474.

CASE 3. ZIEHL from von Heumann.

CASE 4. ZIEHL from von Passaeur. Virchow Archiv, 1886, vol. xxxvii, p. 410.

CASE 5. ZIEHL from Beck. Med. Annalen, 1836, p. 89.

CASE 6. LANZ. Deutsche Zeitschr. f. Chir. Leipzic, 1900. lviii, pp. 580–585.

CASE 7. KIWULL. Fortsch. d. Med. Berlin, 1890. viii, pp. 121–127.

CASE 8. SCHEICK. Berlin klin. Wchnschr., 1883, xx, p. 700.

CASE 9. SAUCEROTTE by Baumgarten.

CASE 11. BICKERSTETH by Baumgarten.

CASE 12. HEATH by Baumgarten.

CASE 13. PIQUET by Baumgarten.

CASE 14. LE DENTU by Baumgarten.

CASE 15. PEAN by Baumgarten.

CASE 16. LE DENTU. Bull. Acad. de med. 3. serie xli, 1899. Paris. p. 428–448.

CASE 17. BASSOE. Transactions of Chicago Pathological Society, 1901-3. Vol. cxi, pp. 231–232, and the Journal of Nervous and Mental Diseases, vol. xxx, Sept. 1903, p. 513.

ADDITIONAL LITERATURE

Excellent articles upon this subject have appeared by Baumgarten, Putnam, and Bassoe. The latter appends an excellent bibliography of gigantism and leontiasis ossea.

In addition to the bibliography given in the individual reports of the cases and skulls, the following should be noted.

SEMPUN. Leontiasis Ossea. Corresp. Med., Madrid, 1902, xxxvii, 224–235.

MILLAT. De la leontiasis ossea, Gaz. d. hosp., Paris, 1892, lxv, 921–928.

VIRCHOW. Die Krankhaften Geschwülste, Virchow.

CHEVALLEREAN. Die Ophthal. Clinik, vol. iv. s. 9.

INTERNAL DERANGEMENT OF THE KNEE-JOINT[1]

With Report of Cases

By LEONARD FREEMAN, M.D., Denver, Colorado

NO other joint is of more importance than the knee, because it has to support the weight of the body, and because locomotion depends so largely upon its integrity. An individual with a crippled knee — and there are many such — is in a sad plight indeed, and often incapacitated from earning a living. In spite of this, affections of the knee-joint, outside of tuberculosis and floating cartilages, have not received adequate attention from the profession at large, especially in this country. This indifference arises from several sources: from lack of emphasis of the subject in most of our colleges and text-books, from difficulties of diagnosis, and from fear of operations upon the knee by both patient and physician; this fear being based upon the idea that stiffness is very apt to result from loss of lubricating fluid or from adhesions. It should be more thoroughly understood that permanent stiffness seldom follows an operation on the knee, when it is properly done, when the cause of the original trouble is removed, and *when infection does not occur*, infection being by far the most prominent factor. The loss of lubricating fluid, so greatly feared by the laity and by many physicians, is of small importance, as it is rapidly reformed. Temporary stiffness, however, generally follows an operation of any magnitude, and sometimes persists for months, and for this the patient should always be prepared. Hence, for this reason, and because of the danger of infection, which, although slight, is ever present, the knee-joint should never be opened without good cause, and then under the most favorable circumstances; but when such a cause exists, an operation should be done without hesitation.

In this paper I shall confine my remarks to affections of the semilunar cartilages, which, aside from tuberculosis, are perhaps the most frequent sources of chronic knee-joint troubles. They come under the head of "internal derangements of the knee," which term was introduced by Hey over one hundred years ago. It must be understood, however, that this designation is a general one, covering a number of distinct lesions, each presenting similar symptoms, among which a differential diagnosis is often extremely difficult, or even impossible without an operation. Under this head, for instance, come: elongated synovial fringes; folds of thickened synovial membrane; abnormal masses of subcapsular fat; rupture of the crucial ligaments; elongation of the patellar ligament; relaxation of the lateral ligaments; loosening of the semilunar cartilages; rupture or splitting of the semilunar cartilages; bruising of the semilunar cartilages, followed by their chronic enlargement; loose bodies and tumors of various kinds; together with numerous other difficulties of a more or less definite nature, such as sprains, faulty distribution of body-weight, rupture of ligaments, etc.

Owing to the uncertainty of accurate diagnosis in many instances, "internal derangement" remains, perhaps, the best designation for a certain group of symptoms. Other terms are "loose, movable, or dislocated semilunar cartilages," "subluxation of the knee," "Hey's joint," "spring-knee," "trigger-knee," etc.

Pathology. The semilunar cartilages occupy the circumference of the flat, and even somewhat convex, surface of the head of the tibia, and by their wedge-shaped form assist in holding the condyles of the femur in their proper position. Most of this work, however, is done by the lateral and patellar ligaments, so that the semilunars can be removed without serious difficulty resulting. They are firmly held at both ends, but somewhat loosely attached to the tibia and joint-capsule at all other points, so that they are naturally slightly movable, and it is only when their movability is considerably increased that it becomes of pathologic importance. When this is the case, a cartilage may get pinched between the articulating surfaces of tibia and femur during certain movements

[1] Read before the Colorado State Medical Society, Denver, October, 1906.

of the knee, or it may be squeezed forcibly out between the bones and the capsule. In either case pain and locking of the joint result, accompanied often by swelling and intra-articular effusion. Frequently the cartilage becomes frayed along its internal border, or even torn across, split lengthwise, or twisted upon itself. Occasionally it is detached at one end or at both ends, and may float about in the joint like a pedunculated tumor, or lie curled up in the intercondyloid notch. According to Roux, the cartilages sometimes become thickened from repeated injuries (chronic traumatic meniscitis), even when they are not abnormally movable, and thus give rise to painful symptoms by interfering with complete extension.

Undoubtedly, laxness of the lateral and patellar ligaments often has much to do with internal derangement, inasmuch as it permits of undue rotary movements of the tibia upon the femur, thus leading to displacements and injuries of the cartilages. In some knees this laxity is so great that the head of the tibia may even slip directly backwards far enough to engage the semilunars between the articulating surfaces. Malformations of the limb, tending to knock-knee or bow-legs, may be concerned in producing this relaxation, as may also rachitis, and distention of the joint with fluid from various causes.

Causes. The usual cause, in the acute form, is a sudden and forcible twist of the tibia upon the femur while the knee is more or less flexed. Relaxation of the ligaments undoubtedly adds to the danger, but it is not a necessary factor, as internal derangements often occur in athletic young men, where laxity of the ligaments could not be suspected. The accident often happens in football, in alighting from moving cars, and in falls of various kinds. It is produced by a femoral condyle either overriding the outer edge of the corresponding semilunar cartilage, or else pushing the cartilage before it, tearing it more or less from its moorings, and crowding it outwards against the capsule. When once loosened in this way, the cartilage is apt to slip again under much slighter provocation.

The onset of an internal derangement, however, is not always acute nor due to a serious accident; and this, I am sure, is often responsible for its being overlooked. It may come slowly, especially in the presence of relaxation of ligaments, the cartilage becoming gradually loosened by repeated and comparatively trivial twistings of the leg. This is seen in rapidly growing children, particularly those afflicted with rachitis, in women of lax build who have gained suddenly and markedly in weight, and in those whose occupations require them to spend considerable time upon their knees with outward rotation of the feet; as in housemaids, miners, and religious devotees. In arising from such a position the knee will often suddenly "lock."

Symptoms. The most prominent symptom is sudden locking of the knee, accompanied by great pain and inability to straighten the limb, although it can often be flexed without great difficulty. This is said to differentiate the trouble from a sprain, in which the knee can be extended, but not flexed (Cotterill). The most that can be said of this diagnostic point, however, is, that it is suggestive, but not reliable. Following the accident, soreness remains over the semilunar cartilage, together with puffiness of the side of the joint, and occasionally hydrops articuli. Repeated occurrences of the phenomenon cause this condition to become chronic, and disability of the joint results. Sometimes an elevation or a depression can be detected at the site of the cartilage; but this is by no means always the case, and should not be too strongly considered in diagnosis.

It should be emphasized that many cases of internal derangement come on more or less slowly, without accident and without sudden locking of the joint, merely exhibiting pain, soreness, and puffiness over the semilunar cartilage, together with loss of function. Such conditions are apt to be misinterpreted, and thus escape proper treatment.

In acute cases, and in severe chronic ones, the disability may be great enough to necessitate the use of crutches, or even to prevent locomotion altogether. Acute locking of the joint may occur only at long intervals, or it may take place so frequently as to cause great anxiety every time the patient moves about, owing to the embarrassment and danger of suddenly falling in the street or elsewhere. The cause is often ridiculously trivial, such as stubbing the toe,

turning suddenly to look over the shoulder, rolling over in bed, etc. In those whose avocations require free use of the lower limbs, the inconvenience is sometimes extreme, and such unfortunates are to be found in almost every community.

Treatment. In acute cases, where the joint is locked and painful, the first thing to do is to replace the dislocated cartilage, if possible. This can usually be done by flexing the joint still further, rotating the tibia outwards or inwards, according to circumstances, and then making rapid extension. This does not generally require an anæsthetic, because, although painful, it can be quickly accomplished. No absolute rules can be given, however, as to the exact method of manipulation, although, in general, where the internal cartilage is concerned, the tibia should be rotated outwards, and *vice versa*. In the majority of cases, various twistings, flexions, and extensions will have to be done until reduction is accomplished. Further treatment consists in the application of a splint, together with hot or cold compresses, until the symptoms have subsided. Complete rest should be enjoined for some days, followed by the use of some form of apparatus, such as that suggested further on, until the cartilage has had an opportunity to become adherent in its original position, which will require at least from three to five weeks. It may be said that if these precautions were always carried out, there would be far fewer cases of chronic internal derangement and much less necessity for operations.

Where the cartilage has been slipped a number of times and has become more or less permanently loose, the problem of cure is more difficult. Many things have been advocated, including the wearing of plaster casts, elastic knee-caps, and braces confined to the vicinity of the joint (Marsh); but, although these appliances undoubtedly do some good, they often fail, because they do not prevent rotation of the tibia upon the femur, which is the essential cause of the trouble. An elastic knee-cap is particularly useless, and perhaps harmful, in that it tends to cause weakening of ligaments and atrophy of muscles, upon the tension of both of which the integrity of the joint so largely depends.

Massage has been suggested, as well as counter-irritation by means of the thermocautery. Either of these measures may be of service in mild cases, and may always be employed to advantage in connection with an appropriate brace; but in bad cases, especially where rupture of the cartilages exists, they are of little use.

In many instances good results may be obtained by the use of a properly constructed brace, such as that described by Shaffer of New York (*Annals of Surgery*, 1898, vol. xxviii, p. 417). This consists of a light steel rod, padded at the knee, and hinged so as to permit flexion of the joint, and running from well up on the thigh down the outside of the limb to the heel, where it is attached firmly to the shoe. A shorter rod, also hinged, is placed along the internal surface of the limb and carries a round pad which presses against the lateral surface of the joint. The apparatus is held in place by a broad band of leather about the thigh, and narrower bands above and below the knee. (See illustration.) The hinges in the rods are so arranged as to prevent full extension of the joint, thus doing away with all stretching of the relaxed and weakened ligaments, and permitting them to contract gradually and become more firm. Such a brace not only supports the joint in every way, giving a sense of security and permitting locomotion without fear or danger, but, what is of paramount importance, it guards against rotation of the tibia upon the femur, which is not true of any form of brace not reaching from the thigh to the foot.[1]

During the last few years I have used this apparatus some fifteen times, with very satisfactory results, nearly all the cases, however, being mild ones and not of long standing. Nine patients recovered entirely, the rest being either improved or lost sight of.

Acute cases should never be operated upon; but in bad chronic cases, and in those where the use of a brace has failed (and a brace should always be tried, where there is the slightest prospect of cure) an operation is not only indicated, but imperatively called for. *It should always be conducted, however, under the most careful surgical precautions, and never undertaken otherwise.*

[1] The Shaffer brace has been excellently constructed for me by Mr. William Jones, 1430 Stout Street, Denver, Colorado.

Fig. 1. The Shaffer brace.

If the joint contain fluid, I can see no reason for delay until this has become absorbed, as is insisted upon by English writers on account of the supposed increased danger of infection from stitch-abscesses; because fluid always accumulates, anyhow, as an effect of the operation itself. Many forms of incision have been suggested, but the one I have devised and always used has been so satisfactory that I have not seen fit to try any other. This incision forms a U-shaped flap of all the tissues, including the capsule, upon the internal or external surface of the joint, as required, and lying between the lateral ligament on the one hand and the patella and its ligament on the other. (See illustration.) The base of the flap may be either upwards or downwards, but it must be so arranged as to uncover thoroughly the edge of the tibia and the semilunar cartilage surmounting it. Division of the lateral ligament is seldom necessary. I have occasionally varied the procedure by turning a skin-flap upwards and a flap of the deeper tissues downwards, so as not to bring the lines of suture opposite each other, but I do not know that any advantage exists in this modification.

Hemorrhage should be checked by crushing the vessels and by torsion, rather than by ligatures, and if the fingers are inserted in the wound at all, they should always be encased in rubber gloves. In order to carry out the most rigid asepsis, a face-mask should be worn. There must be as little rough handling of the tissues as possible, and blood should be removed from the joint, with or without irrigation, as may be indicated.

Several English surgeons have strongly advised merely sewing the loose cartilage to the periosteum of the tibia, instead of removing it; but this custom is not generally followed in this country nor in other countries, although it will occasionally succeed. By far the better plan is always to excise the entire cartilage, in spite of the fact that some operators have advised removal of the external border only, others the internal border, and still others the mere excision of loose fragments, where they exist.

In excising the cartilage, it should be pulled out of the joint with a blunt hook (forceps slip

Fig. 2 Line of incision.

off too easily) and cut from its moorings with scissors. Once or twice I have been able to twist the cartilage from its posterior attachment after cutting it free anteriorly.

The capsule and fascia should be accurately reunited with continuous catgut sutures, in order to avoid unnecessary knots, and the skin sutured with silkworm-gut. Drainage is unnecessary, unless oozing persist, and then it should be used for a few hours only. A snug bandage and a posterior splint complete the dressing.

Slight passive motion and massage should be begun in about two weeks, and soon after this the patient can be permitted to get about on crutches, with gradually increasing use of the limb.

Swelling, tenderness, and inhibition of function always persist for a number of weeks, and even months, so that, unless the patient be forewarned, discouragement often results; but the final outcome is almost invariably satisfactory. Properly conducted massage and passive motion are of great assistance, and are always indicated. An occasional use of the thermocautery or the hot-air bath may be of advantage.

My experience is limited to ten excisions of semilunar cartilages, done upon eight patients. Three of these operations have been done too recently to be of value. The reports which follow are brief histories of the six remaining cases:

CASE 1. Mr. C., aged 30, baker. As a result of twisting the right leg externally while the knee was flexed, the joint became suddenly "locked," which was accompanied by pain and tenderness over the internal semilunar cartilage and some swelling. The difficulty recurred frequently during the course of more than a year, giving rise to great disability and suffering. Considerable relief was obtained by wearing a plaster cast; but as soon as this was removed the trouble returned. At the time I examined him he had been using crutches for several months, and was unable to pursue his occupation. The joint was moderately swollen, and tender over the internal semilunar cartilage, but there was no prominence or depression at this point. It could be moved and straightened without pain, but the weight of the body could not be sustained upon it. *Operation:* At St. Joseph's Hospital, March, 1901. A U-shaped flap of skin, fascia, and capsule was turned upward on the internal aspect of the joint and the semilunar cartilage excised. It was completely loose, except at its extremities, and lay rolled upon itself across the joint, between the head of the tibia and the condyle of the femur. Primary union. Much stiffness and soreness persisted for several weeks; but at the end of nine or ten weeks the limb could be used fairly well. On August 19, 1906, five and one half years after the operation, the patient writes: "I have gone hunting in the mountains nearly every year since, and can walk better than most men, and take longer walks. . . . My work keeps me on my feet twelve or fourteen hours daily, so the knee don't get much rest."

CASE 2. Mr. B., aged 38, mining engineer. Injured his left knee in a game of football many years ago, and twice since that time. The first injury was a blow on the outside of the joint, and the last a twist of the leg, sustained in jumping from a wall. On each occasion the knee became painful, swollen, and tender over the internal semilunar cartilage, and it was necessary to use crutches for several weeks. Since the last accident, two and one half years ago, he has been upon crutches continuously, and unable to attend to his duties. Plaster casts had been worn for months at a time, without permanent improvement. The knee was not swollen, but the muscles of the calf and thigh were considerably atrophied. There was no external evidence of derangement of the semilunar cartilage, although the joint was tender in that region. Extension was complete, the patient stating that he had never experienced difficulty in this regard, but no weight could be borne upon the limb. *Operation:* At St. Joseph's Hospital, January, 1906. The joint was opened on the internal surface by the formation of a U-shaped flap with its base upwards, and the semilunar cartilage found completely loosened from its attachments, except at its ends, its posterior half being split longitudinally. It lay between the articulating surfaces. Primary union. In four or five weeks the knee, although somewhat swollen and still tender, could be bent to an angle of 120°, and the patient could walk several squares without support. A letter written some eight months later stated that he "could do everything [with the joint] but run." The last I heard from him he was in the Klondike, and the knee was in excellent condition.

CASE 3. Mr. C., aged 35, locomotive-engineer. About twelve years ago be sprained his left knee in alighting from a railroad train. Since then the joint has been "weak," and every few months would gradually swell, causing protracted inconvenience and pain. For some time he has used crutches and has been unable to work. The greatest amount of pain was felt just below the patella and just above it, but the most pronounced tenderness was over the internal semilunar cartilage. *Operation:* At St. Joseph's Hospital, November, 1905. A U-shaped flap was turned upwards internal to the patella ligament, the semilunar cartilage found loosened from its central moorings, and excised. Primary union. Nine months after the operation the patient reported that "this leg was just as limber as the other," and the recovery complete.

CASE 4. Miss G., aged 15, school-girl. Fell about ten months ago, injuring her left knee upon its internal surface, the joint remaining tender, painful, and swollen, with inability to extend it completely. Plaster casts were

ineffectually employed, under the impression that the trouble was tuberculous, and for the last three months she has been unable to walk without crutches, and has suffered much. On examination, the knee was found swollen and tender over the internal semilunar cartilage, although no projection or depression could be detected. *Operation:* At St. Joseph's Hospital, June, 1905. The skin was turned upwards internal to the patellar ligament by means of a U-shaped incision; while the deeper tissues, including the capsule, were turned downwards in a similarly shaped flap, so as not to bring the inner line of incision opposite the outer one. The semilunar cartilage was found loosened from its attachments, except at its extremities, and was excised. Primary union. The joint remained stiff and tender for several months, but when the patient presented herself for examination one year later, she could walk easily without support, although a moderate amount of tenderness of the joint still existed and flexion was not quite complete. Improvement is still taking place, and there can be little doubt that complete restoration of function will ultimately result, although it probably would have been more rapid if proper massage and passive moments had been employed.

CASE 5. Master B., aged 13, elevator-pilot. Several years ago the left knee gradually became lame, without any injury that could be recalled. It would frequently "lock" suddenly in a moderately flexed position, accompanied by swelling, pain, and tenderness over the external semilunar cartilage. His physician diagnosed tuberculosis, and placed the joint in a plaster cast for a year. This gave rise to improvement, but as soon as the cast was removed the trouble returned as bad as before. On examination, the knee was found to be slightly flexed, stiff, swollen, and tender, so that the use of crutches was necessary. *Operation:* At St. Joseph's Hospital, January, 1905. Separate U-shaped flaps were employed for the skin and deeper tissues, the outer one having its base downwards and the inner one upwards. The external semilunar cartilage was very loose in its central portion, and was removed by dividing its anterior attachment and twisting it out of the joint with large forceps. Primary union. Although considerable soreness and stiffness followed, the joint gradually recovered its usefulness, and the boy returned to his usual work. Some three months after this operation, while jumping into his elevator, he twisted his knee and struck it against a large box. Swelling and great pain resulted, with tenderness over the *internal* semilunar cartilage. At the end of six weeks he was still confined to bed, and suffering intensely upon the slightest movement of the partly flexed joint. Other treatment failing, it was decided to remove the internal semilunar cartilage. *Operation:* At St. Joseph's Hospital, May, 1906, an internal U-shaped skin-flap being employed, with the base upwards. The deeper tissues were divided by a similarly shaped incision, with its base downwards. The cartilage, which could be felt through the skin, was very loose and was excised. Recovery from stiffness and soreness was slow, but the result was reported as satisfactory at the end of about four months.

CASE 6. Sister — aged 29. Has had a "weak knee" on the left side for seven or eight years, which was always more or less tender, and would occasionally "lock" and cause her to fall, especially when the leg received a twist. The trouble appeared gradually, and without an injury, as far as could be remembered. For a year she had been unable to walk without support, and for three weeks previous to the operation the knee could not be flexed without "catching," so that she felt compelled to walk backwards, dragging, as it were, the extended limb after her. *Operation:* At St. Joseph's Hospital, September, 1902. U-shaped flap, with base upwards, over internal surface of joint. Two pathologic conditions were found: a loose semilunar cartilage and an abnormal amount of subcapsular fat projecting into the articulation. Both cartilage and fat were removed. Primary union. Considerable tenderness and stiffness followed the operation, but by the end of three months the patient could walk without support of any kind, and from that time her improvement was rapid and satisfactory. At present, four years after the arthrotomy, she walks without discomfort or limping, and remains on her feet all day.

PECULIAR CASES OF TRAUMATISM OF INTERNAL ORGANS, SOME DUE TO TROPICAL CONDITIONS AND PRACTICES

By MAXIMILIAN HERZOG, Late Pathologist Bureau of Science, Manila, P. I.

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DURING the years 1904 and 1905, the writer, among his autopsy material in Manila, encountered five cases of fatal traumatism of internal organs without external injuries. However, in two of these five instances fractured ribs were responsible for the internal damage, followed by fatal hemorrhage. Each one of the five cases presents quite peculiar and noteworthy features; two are probably unique in kind. Two were cases of rupture of the spleen occurring in splenomegaly; two were cases of rupture of the heart; one a fatty heart which, in the absence of any other injury, in consequence of a slight fall was pierced by a rib; and one case, rupture of a fatty liver occurred during parturition in consequence of a native obstetrical practice.

TWO CASES OF SPLEEN RUPTURES IN SPLENOMEGALY

Rupture of the spleen, in the tropics, is probably not at all rare, though heretofore this appears to have been the general impression.

Glogner[1] has quite recently called attention to its occurrence in Java, where, during the years 1893–1898 he saw ten cases of rupture of the spleen. A summary of Glogner's observations will be of interest. In all ten cases the spleen was enlarged, several times quite considerably; in all, the insult which caused the rupture, followed by fatal hemorrhage, was comparatively slight; in four cases malarial parasites were found in the spleen upon postmortem examination. Glogner, from his observations, draws the practical conclusion that a person during or after a malarial infection, as long as an enlarged spleen is present, should be guarded carefully against any danger which might lead to a rupture of the spleen. Our own two cases of rupture of the spleen are the following:

Case No. 1. Juan Reyes, a 15 years old Filipino boy, residing in Manila, on July 15, 1904, was brought to the San Juan de Dios Hospital. It appears that the boy had received a slight kick or had suffered a fall. No diagnosis was made and he died in syncope July 16th, P.M. Post-mortem examination made July 17, 1904, at 10 A.M., fifteen hours after death. Body of a well-developed young male native. Post-mortem rigidity still quite well marked. Post-mortem lividity very moderate. The whole surface, particularly the mucous membranes, are very pale and anæmic. The abdomen appears much distended, particularly the upper part. There are no signs of external violence, and no wounds or abrasions. On opening the abdomen very extensive blood coagula are found to fill every available space below the diaphragm. Serum has collected in the dependent parts of the abdominal cavity, and the mass of serum and coagula removed amounts to about two to three liters. All the organs are found to be very anæmic. The heart is soft and flabby but otherwise normal. The lungs are rather collapsed and pale pink in color. Both of them have formed some adhesions, and the apex of the right lung contains four caseous nodules, varying in size from a pea to a hazel-nut. Otherwise, the lungs, the trachea, the bronchi, and the larynx are normal. The spleen is very soft, flabby and friable, measuring 23 x 10 x 6½ cm. and weighing 655 grammes. The capsule is wrinkled, transparent and grayish-blue. The veins entering the hilum are very much enlarged and have very thin walls. On the posterior lateral surface of the spleen, namely, that which was in contact with the internal thoracic wall of the left side, there is found a rupture, which extends from the outer lateral margin of the organ toward the hilum. The rupture is about six centimeters long and is directed somewhat downwards. It forms a triangular gap, the basis of which is found right at the hilum, being 2½ cm. long. The rupture has torn into some of the larger branches of the splenic vein. The lesser omentum contains a small round body of the size of a hazelnut, which is either an accessory spleen or a hemolymph gland. On inspecting the internal wall of the thoracic cavity, it is found that the 9th rib of the left side is fractured. This fracture is situated 9.5 cm. behind the anterior end of the rib. It is an incomplete green stick fracture, and is situated right in the mid-axillary line. The anterior segment of the fracture is very sharply pointed. It projects somewhat into the pleura costalis. The region around this fracture, for a radius of several centimeters is hemorrhagic. It is clear that this fracture must have been produced by a dull force, which, however, left no sign on the integument. It was probably a force exerted very quickly, not crushing the soft parts but splitting the rib and driving the anterior fragment into the exceedingly soft, friable, enlarged spleen and producing a rupture. The kidneys are normal. The adrenals are

[1] Glogner. Ueber Milzrupturen in den Tropen. Archiv f. Schiffs u. Tropenhyg, 1906; x, 17.

normal. The capsule of the liver is smooth and transparent, and in color pale pinkish-blue, the upper surface showing a number of small punctiform hemorrhages. On the cut surface the organ looks brownish-pink. The gall-bladder is normal. The ducts are normal. The mucosa of the duodenum and stomach is pale. The small intestine, the large intestine, the prostate, etc., are normal. The brain and cord are normal.

Anatomical Diagnosis: Splenomegaly (primary?), fracture of the ninth rib of the left side, rupture of the spleen, hemorrhage, general anæmia of all the internal organs, tuberculosis of the apex of the right lung. No malarial parasites were found in smears prepared from the spleen.

CASE No. 2. Maximo Villaflor, 25 years old, a native Filipino living in Manila, was working on a new building on February 13, 1905. He was engaged in lifting, by means of a lever, certain heavy weights, and just as he had brought the lever to the required elevation, he staggered and fell to the ground. His friends applied "smelling salts," thinking that he had fainted, but as he did not respond to this treatment, the Board of Health was notified. The time between the injury and his death was probably about twenty minutes. It was stated by his wife that his health had been the same as it always had been since she had known him. The post-mortem examination was made two hours after death. The findings were, beginning cirrhosis of the liver, splenomegaly (very large spleen), rupture of the spleen, copious hemorrhage into the abdominal cavity. No external injuries, no ribs fractured. Smears from the spleen showed neither malarial parasites nor the Donovan-Leishmann bodies.

PERFORATION OF THE HEART

The two following are cases of perforation of the heart. In one of the them the myocardium was ruptured by a fractured rib, *but not the pericardium*, and the victim did not die from the effects of losing a large amount of blood, but from compression of the heart and cessation of its action. In the second case, a floating rib perforated a heart, which was in an advanced condition of fatty degeneration.

CASE No. 3. Mrs. Manuela Ramos, from Intramuros, Filipina, age 25, died July 17, 1904. The post-mortem examination was made July 18th, twelve hours after death. Immediate cause of death not known. It was stated that she had been struck by a carromata shortly before she died. Body of a well-developed young native woman, 25 to 30 years of age. Post-mortem rigidity strongly marked. Post-mortem lividity quite noticeable. Abdomen somewhat distended. A repeated careful inspection fails to show any signs of external violence. No wounds, contusions or abrasions of any kind to be seen. On opening the thoracic cavity, the pericardium is found to be much distended, and shining through it there appears to be a firm, dark, blood coagulum. On opening the pericardium, it is indeed found that it contains a large amount of dark, coagulated, gelatinous blood and blood-tinged serum, distending, the pericardium ad maximum and compressing the heart. A careful examination fails to show any perforation in the pericardium. The heart, which weighs about 226 grammes, presents a perforation, which begins 2 cm. to the left of the anterior border of the interventricular septum. The perforation extends almost horizontally toward the left, being a little downwardly inclined. It forms a slit 2.2 cm. long, running 5 cm. above the apex, and 5.5 cm. below the sulcus of the heart. The edges of the perforation are almost clean-cut where they enter the myocardium, as if they had been produced by a dull, somewhat serrated knife. The cut takes a somewhat downward and inward course, traveling through the whole thickness of the myocardium. Where the cut enters the cavity of the heart, the margins are not very smooth, but rather irregular and ragged. The consistency of the myocardium is good. Its color is pinkish-brown and all the serous surfaces are smooth. There are no atheromatous changes. The heart is covered with a very moderate amount of epicardial fat. In short, the whole organ is absolutely normal. After the removal of the lungs (the apex of the right one showing a very few tubercles, and a little caseous nodule not larger than a lentile), it is seen that the second, fourth, and fifth ribs are fractured. The fracture of the second rib is found to be 7.5 cm. posterior to the sternal articulation, that of the fourth one 9.0 cm., and that of the fifth one 9.5. The anterior fragments are directed inwards. The fragments of the fourth and fifth ribs are very sharp and are surrounded by an area of subpleural blood extravasation. However, these fragments have not perforated the pleura costalis. The extravasated blood is strictly sub-pleural and no free blood is found on the surface of the pleura. The uterus appears somewhat enlarged and the left ovary shows a fresh, however already closed, corpus luteum. On opening the uterine cavity, a little hemorrhagic mass, about ½ cm. in diameter, is found imbedded in the mucosa of the posterior wall, near the entrance of the left tube. This mass was carefully cut out and placed in Zenker's solution, as it might, of course, be a very young ovum.[2] All the organs of the body, with the exception of the apex of the right lung, are found to be absolutely normal. They are all more or less congested with dark fluid blood. It appears clear that the woman must have been struck at the side of her body, or in the back, by a swiftly moving force. This force, however, did not produce any signs of external violence, particularly no contusions, abrasions, or wounds. The force traveled through the soft parts, and meeting the resistance of the ribs, fractured them. The anterior sharp fragment of the fourth or of the fifth rib was evidently driven into the wall of the left ventricle, producing a complete perforation. A highly interesting point is that the sharp fragments neither perforated the pleura costalis nor the parietal layer of the pericardium. Only when the resistance of the firm wall of the ventricle was encountered, did a rupture or perforation occur, a hemorrhage took place and when the pericardium was completely filled, and the myocardium much

[2] This material has not yet been examined microscopically.

compressed, the heart's action came to a sudden standstill. Death occurred from syncope.

Anatomical diagnosis: Fracture of the second, fourth, and fifth ribs of the left side. Complete perforation of the wall of the left ventricle. Hemorrhage into the pericardium. Compression of the myocardium. Beginning tuberculosis of the apex of the right lung.

Microscopic examination of the myocardium showed it to be perfectly normal.

CASE No. 4. May 15, 1905. Antonia Ramos, 70 years old, female Filipina, died May 13, 1905, at 3 P.M. Post-mortem examination 42 hours after death. This woman fell downstairs. She immediately went into collapse and died within fifteen minutes of the accident.

Body of a medium-sized, quite fat woman, probably younger than 70 years old, perhaps 60. Post-mortem rigidity has disappeared, post-mortem lividity well marked and extensive over the dependent parts of the body. Putrefactive changes well advanced. A close inspection fails to show any signs of external violence; there are no signs of a contusion, the skin shows no areas of suggillation. On opening the body, the abdominal cavity presents nothing abnormal. In the thoracic cavity, however, the pericardium is found distended and it contains a soft blood coagulum and hemorrhagic, dirty-brown fluid. A blood coagulum of the size of two fists is also found in the right pleural cavity. The anterior surface of the pericardium presents a slit 18 mm. long. Its direction is from above downward, its margins are sharp cut, linear on the whole but here and there irregular and wavy; however, not serrated or fringed. Corresponding to this slit in the pericardium there is a perforation in the anterior wall of the right ventricle. It is almost immediately to the right of the interventricular septum and 8.5 cm. above the apex of the heart. It is 7 mm. long but not clean cut, rather irregular and with ragged margins. Its direction is oblique, being from above and to the left, to below and to the right. The perforation traverses the whole of the myocardium, which is here less than 2 mm. thick. The exit of the perforation into the endocardium is about one half the size of its entrance at the outer surface of the myocardium. The heart as a whole is somewhat enlarged in its diameters; it measures from base to apex 13.5 cm.; across at the broadest point, 9 cm., and it is 7 cm. thick. It weighs, including the arch of the aorta, 380 grammes. The walls of the left ventricle are thickened, but the myocardium here, as elsewhere, is very friable, flabby and soft, and of a grayish-yellowish dirty-pink color; it is porous and honeycombed, but this condition is evidently due to the action of gas forming bacilli and must be looked upon as a post-mortem change. The right ventricle is dilated; its wall, particularly the anterior part, is very thin, measuring on an average only 2–3 mm. in diameter. The endocardium is smooth, the valves show no changes, but the right auriculo-ventricular opening is enlarged. The whole arch of the aorta is atheromatous and the intima covered with calcareous patches; the coronaries are likewise atheromatous. The lungs are normal. The osseous framework of the thorax is normal, none of the ribs are broken, but both of the tenth ribs are unusually long and their free floating ends reach very much forward. The tissues over the free end of the tenth rib of the right side are decidedly hyperæmic; however, there is no break of continuity in this region. The spleen is very small, soft and mushy. The kidneys are small, slightly uneven, the capsules peel off with some difficulty. Other abdominal organs normal, putrefactive changes well advanced. The brain is of medium size (weight 1210 grammes), all the arteries at the base in an advanced stage of atheromatosis.

Anatomical Diagnosis: Hypertrophy with concentric atrophy, fatty degeneration, and dilatation of the myocardium. Perforation of the myocardium and of the atrophic anterior wall of the right ventricle; hemorrhage into the pericardium and into the left pleural cavity. Extensive atheromatosis of the aorta, of the coronary arteries, and of all of the vessels at the base of the brain. Atrophic interstitial nephritis of moderate degree. Abnormal length of both of the tenth ribs. Epicrisis.

It is evident that in consequence of the fall, the free end of an unusually long and far forward reaching tenth rib perforated the pericardium and the atrophic degenerated myocardium, and led to the hemorrhage which became fatal inside of a short time after the accident had happened.

RUPTURE OF THE LIVER DUE TO AN OBSTETRICAL PRACTICE IN THE PHILLIPINE ISLANDS

It is a well-known fact that certain races have adopted peculiar practices to assist a parturient woman during labor, in order to facilitate and hasten the expulsion of the child from the uterus. The North American Indians, for instance, place a woman in labor with her back against a tree; an old woman then stands behind the tree, reaches around the latter and the woman propped up against it, and makes violent compression over her abdominal region. The native Filipinos have a method which, while different in arrangement, is based upon the same principle. They place a folded piece of cloth, a long towel or something like it, above the bony pelvis, around the loins of the woman in labor, and then one or two persons with all their might make traction on the encircling bandage. That this method may, under special circumstances, lead to a good deal of harm, in fact to a fatal issue, is shown by the following case. Nothing is known about the clinical history, except that Medical Inspector Dr. Shattuck was called, in February, 1906, to view the remains of a woman who had died quite sud-

denly during labor. The body was sent to the morgue, where a post-mortem examination was made. The following were the findings:

MANILA, FEBRUARY 7, 1906, necropsy about 20 hours after death. Cirilia, second name unknown, age unknown, a female Filipina from Malate, died February 16, 1906, at 1:15 P.M. Cause of death, unknown. Body of a woman, about 35 years old, of medium size and fair nutrition. The woman appears to be pregnant, at or near full term. She appears to be a primipara, because the abdominal wall does not present any striæ. There are no external anomalies, but the labium majorum of the left side shows a pediculated fibroma of the size and of the shape of a large pear. A piece of cloth, in the form of a bandage, is tied around the upper part of the abdomen above the umbilicus. This bandage has been drawn so tightly that it has left a deep anular impression running around the abdomen and back. Post-mortem rigidity has almost disappeared. The post-mortem lividity is well advanced. On cutting through the skin the tissues are found to be very anæmic, and on cutting through the peritoneum the upper part of the abdominal cavity is found to be full of clotted and fluid blood. An examination shows that this hemorrhage has come from a ruptured liver. Further examination of the internal organs shows the following: The heart is exceedingly soft and flabby, grayish-yellow in color. The spleen is small, soft and friable, otherwise normal. Both kidneys show signs of fatty and parenchymatous degeneration. The liver is large, somewhat swollen, weighs 2280 grammes, is pale yellow in color and exceedingly soft and flabby, and so friable that on handling it, a rupture is produced on the upper surface of the left lobe. The upper surface of the right lobe presents two deep lacerated perforations and the tissues here are suggillated with extravasated blood. It was at this place that clots of blood were found on opening the abdomen; they had to be removed in order to show the condition of the liver. Examination of the region of the liver and of the right thorax shows that the ruptures in the liver have been produced by the eleventh rib of the right side. It is possible that the outer one of the two perforations has been caused by the twelfth rib. The pleura over the external end of the eleventh rib shows a small area of blood extravasation. It is evident that when this rib was pressed against the liver, perforating the latter, there was enough force used to cause a slight hemorrhage of the pleura right over the end of this rib. The uterus contains a female child nine months old or, at least, near full term, in breech presentation. The cervix is soft, somewhat hemorrhagic and admits two fingers. Evidently the first stage of labor had begun, but the membranes had not yet ruptured nor had detachment of the placenta taken place. The placenta itself is perfectly normal. All of the other organs, including the brain, are normal, but they are all profoundly anæmic. The 11th and 12th rib were removed and cleaned. The former, the outer end of which presented a sharp point, measured 13.5 cm. in length, the latter, 9 cm.

Microscopic examination of the various organs, pieces of which had been fixed in Zenker's solution and in osmic acid, shows the following: *Liver:* The protoplasm of the parenchyma cells is granular and finely vacuolated, the osmic acid preparations show numerous small dust-like black granules and round black granules, varying in size from a small coccus to about half the diameter of the cell nuclei. There are also seen black masses of the size of a liver parenchyma cell and even larger roundish bodies of this color; these are, of course, all the result of the profound fatty degeneration. The nuclei of the parenchyma cells are generally fairly well stained and many cells show two nuclei. The periportal interlobular connective tissue shows a slight but manifest increase. The *renal* epithelium shows advanced cloudy swelling and fatty degeneration. In the *spleen* marked changes are not present, and malarial parasites are not found. The *myocardial* fibres are very indistinctly striated, vacuolated, and full of fat granules. The *fibroma of the vulva* is composed of loose œdematous, fibrous connective tissue; it contains numerous large vessels; this vascularity had probably developed during the period of gestation.

Anatomical Diagnosis: Fatty degeneration of the heart and of the kidneys, and profound fatty degeneration of the liver. Perforation of the latter by the 11th rib, copious hemorrhage. Uterus gravis menses X.

The anatomical and histological examination of this case plainly shows that this woman was in the first stage of labor, and that she was suffering from a profound fatty degeneration of the liver, which may perhaps have been the first stage of *acute yellow atrophy*. When the bandage was applied to assist in labor, as is habitually done among the natives, the force of the pressure was great enough to drive the sharp point of the eleventh rib into a very soft, flabby, fatty liver and cause a rupture and fatal hemorrhage.

DEPARTMENT OF TECHNIQUE

THE TECHNIQUE OF APPENDECTOMY IN ACUTE AND IN CHRONIC CASES

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In acute appendicitis the incision should be made, first, with reference to protecting as effectually as possible the peritoneum from the infectious material in and about the appendix; and, secondly, with reference to the most efficient possible drainage. When it is evident that the general peritoneal cavity is invaded, I make the incision at the outer border of the right rectus. When there is a circumscribed tumor, the cut is made to the median side of the mass if the case is early and removal of the appendix is planned; it is made directly over the mass, if simple drainage is intended.

The muscle-splitting principle of McBurney is not applicable in acute appendicitis unless the infectious process is confined within the appendix, because it does not permit easy indefinite extension in case of need. The length of the cut depends upon the conditions found. It should be too long rather than too short; and, in any case, three or four inches in length at least. In a word, the cut should be long enough to fulfill the following requirements:

I. Protection of peritoneal cavity.
   a. Efficient protection of the peritoneal cavity when clean;
   b. Efficient limitation of the peritoneal cavity, even if infected, from additional infection;
   c. Efficient soaking-up of exudates already existing.

II. Easy and therefore quick demonstration and removal of the appendix, with the unmistakable recognition of all extensions of infection, and especially of contiguous or remote collections of pus.

In acute appendicitis, therefore, I do not consider the question of short incision at all. In many cases of acute appendicitis, at its very inception, I have used a very short McBurney cut, which in the absence of all signs of infection outside the appendix, I have closed immediately. Relying too much on his diagnosis of a clean peritoneum and appendix, however, the surgeon will sooner or later overlook a beginning infection which drainage might have remedied.

The rule is, to make the cut three or four inches long, and in such a direction and manner that enlargement is easy. In making the cut, my chief object is to get into the peritoneal cavity without breaking the recent adhesions about the appendix before I am ready with the gauze walling. When the first object is to drain an abscess, as in old and large tumors adherent to the abdominal wall, every effort is made to avoid the peritoneal cavity. When nicking of the peritoneum is followed by a spurt of fluid under pressure — and that fluid is turbid, purulent, fæcal, or foul-smelling — the free peritoneal cavity is probably infected. The incision is then enlarged enough to permit the introduction, in all directions, of large gauze masses, especially in the dependent portions of the peritoneal cavity — the flanks and the pelvis. I regard this step as one of the greatest value, for during the other steps of the operation the gauzes become heavy with absorbed exudate, often drying effectively the peritoneal cavity. If the general exudate is large, the gauzes are changed from time to time during the operation.

When on exposing the peritoneal cavity, the surgeon sees only a few drops of clear serum, or none at all, he may be quite sure that the general peritoneal cavity is not contaminated. Under these circumstances I arrange the gauze with reference to the situation of the infected mass, from which I expect soon to separate a gangrenous appendix. Beginning with the pelvic end of the incision and protecting first that most important area, always filled with small intestine, I pack with gauze wicks until the infected area is separated on all sides from the peritoneal cavity by thick layers of gauze.

Occasionally, while I have been packing the gauzes, the adhesions have separated, and the contiguous peritoneum has become immediately and extensively infected. Large masses of gauze are then substituted, as in general infections, for the smaller gauzes.

The rupture of a confined exudate, before the gauze walling has been completed, is a misfortune

not always preventable even by the greatest care. When he rupture occurs, the contiguous coils are necessarily contaminated, and the contamination is more or less extensive. For all practical considerations the infection is a general one; but it is immediately controlled, as far as control is possible by surgical methods. I have no doubt that such an infection adds seriously to the danger, and yet the mortality even in such cases is not large. The operator's chief effort should be, however, to protect the pelvis, the median line, and the right hypochondrium by gauze barriers which are really efficient barriers. The amount of gauze used should be enough to absorb thoroughly all the fluids which come in contact with them. The amount of fluid likely to be set free when the surgeon deliberately separates the adhesions about the appendix, may be gauged with much accuracy beforehand, and the amount of gauze may therefore be made adequate. In placing the gauze, great care must be taken to avoid dragging upon the cœcum, omentum, ileum, or other structures which by recent adhesions are protecting the appendix, for the dry gauze will stick to these viscera and force them apart. The abdominal wall should be lifted and the gauze introduced without touching the adherent masses. For the same reason — lest the infected fluid be prematurely set free — the tumor about the appendix should not be investigated until the gauze has been carefully placed.

When all is ready, and the assistant has at hand plenty of gauze, the surgeon separates the adherent cœcum, omentum, or other structure, where it is attached to the anterior abdominal wall or to the iliac fossa. It is usually possible to see the best line of cleavage. The fingers will prove the easy separability of this line, and will progress without opposition between finely granular peritoneum into a localized peritonitis. If there is much infected fluid about the appendix, this fluid will escape in small amounts through the passage made by the finger, and can be absorbed with gauze as fast as it escapes.

The chief danger in acute appendicitis is surely that of general peritonitis. As I have said, the small intestines fill the pelvis and become immediately bathed in whatever fluids may be in the right iliac fossa, unless these fluids are walled-off, as I have described, and unless, also, they are prevented from escaping with a rush and overwhelming the gauze barriers. In the last event, the barriers will interpose a more or less effective resistance to the spread of infection among the small intestines of the pelvis. The placing of the barriers prior to separation of the appendix is, I repeat, the masterstroke of technique in acute appendicitis.

Not that rupture of a localized peritonitis is necessarily fatal, or even that it always interferes seriously with convalescence, for I have seen patients do well in the hands of surgeons whose first act, after the incision, has been to separate the appendix with the fingers and stir the intestines about in the freed fluids,— whose effort seemed to be to make a thorough mixture of pus and bowels. I cannot but think that this course fails of disaster only because the bacterial element is mild, for in other cases the least contamination of the free peritoneal cavity is likely to be fatal. Indeed in certain infections, the abscess situated and drained extraperitoneally is, in many cases, fatal from septicaemia.

In order to obviate the easy gravitation of pus into the pelvis, I use a moderate Trendelenburg position, just enough to keep the iliac fossa tipped a little toward the right hypochondrium, where infections are much more easily controlled and therefore less fatal. The operator, having mopped up the fluids, with every effort directed against their escape in any direction except toward the opening in the abdominal wall, should next wipe dry the area which these fluids occupied, using small gauzes, first dry, then wet with 1-5000 corrosive sublimate or with peroxide of hydrogen, and finally dry. The gauze walling remains undisturbed, having been soiled only on the surfaces presenting toward the septic field. Just before rupturing the adhesions, I usually place a few additional gauzes which can be quickly removed without breaking the barrier. These I replace with fresh pieces of gauze. The appendix is next separated and delivered. If the appendix is hard to find, I take special care in cleaning the infected field. In searching for the appendix, and in following it up by separating more extensively its adhesions, I am careful to extend the gauze walling. The mistake made at this period — that of extensive search in a blind case — is in not enlarging the incision enough to permit easy search and efficient protection. I do not let considerations of scar influence me in the least when, by too short a cut, search may be impeded or walling made inadequate. It is a question of life, and not one of ventral hernia.

When the appendix has been delivered, my first care is to see that its situation is thoroughly cleansed, for its tip may have been free and its separation may have exposed fresh peritoneal areas to infection. This is particularly true when the appendix is perforated near its base and its tip is in the depth of the pelvis or far over to the left among the small intestines. In some cases the perforation will be so situated in an appendix of large lumen that liquid contents of the cœcum with gas will escape

freely. It is essential to stop this hole as soon as it is discovered. I, therefore, in such cases, put a ligature about the appendix before cleaning and drying the contaminated area.

In very rare instances the perforation will involve the cœcal wall, so that it cannot be closed by a ligature. The appendix is then cut off close to the cœcum, with or without ligation; and the escape of fæcal contents is checked by the finger or by a piece of gauze. The opening in the cœcum is then closed by inverting the bowel wall and suturing it in the manner most convenient and therefore quickest. When the opening has been efficiently closed, I proceed to clean afresh the contaminated areas, wiping with dry gauze, with gauze moistened with bichloride (1-5000), hydrogen peroxide, etc., and then packing in again dry gauze. The hole in the cœcum is now inspected again, and reinforced, if necessary, with additional sutures. In the suturing of the diseased cœcum, difficulty will be met because of the thickened, stiffened, and friable cœcal wall. It will sometimes be hard to depress and invert the wall because of thickness; to bring together the opposing surfaces on account of slipperiness; and to keep them together on account of friability, as the sutures cut out owing to the tension requisite to bring the surfaces together. I use fine chromicized catgut for this suture; sometimes silk. There is no objection to silk in these septic cases, because it is cast off long before the wound is healed. Catgut, however, works as well, and is taken care of by the wound.

When the appendix can be ligated at its base, well above the disease, I tie it off with chromicized catgut, without making any attempt at burying or otherwise disposing of the stump. In those rare acute cases in which I feel safe in closing the abdominal wound, I bury the stump in the cœcal wall, just as in chronic aseptic cases.

The gauze with which the field was packed after evacuation of the septic area and delivery of the appendix, is now removed. This area may be again inspected as before. I now place in contact with the appendix stump a small gauze wick, protected by smooth, impervious material except at the end, where the gauze is bare. When there has been a deep pelvic infection, I place in the depths of the pelvis, between the rectum and the bladder, a second wick, taking great care that the small intestines are not kinked in faulty position and held there by the wick. In very extensive localized infections, I use bare gauze wicks which will absorb throughout their whole length.

The original walling, which from the beginning of the operation has remained undisturbed, is now slowly withdrawn; and great care is taken not to drag into the septic field the non-adherent intestines. The intestines are allowed to take whatever position they of themselves spontaneously assume. Care is taken that the wicks do not kink them where they will form obstructive adhesions.

The wound is now closed above or below — or above and below — the wicks. I use through-and-through silkworm-gut, with buried chromicized catgut.

A large dry gauze dressing is placed over the wound and kept tightly in place by a broad swathe.

In most cases the wicks pour into the dressings thin fluid tinged with blood. I welcome an abundant discharge of this kind, and provide frequent changes of dry gauze. The wicks are removed in three or four days, and especial care is taken not to use too great force. I never use drainage tubes, for fear of pressure perforation of the intestines.

After the original operation, it takes much evidence to induce me to reopen the wound. I have seen cases that were doing extremely well except for a slight rise in temperature and pulse, made worse by what I cannot but call meddlesome interference. Once an adequate outlet is provided, Nature can be trusted to complete the healing. When there is definite and unmistakable evidence of secondary abscess, or of inadequate drainage, then it is time enough to intervene.

In *general peritonitis* of appendicular origin, my present custom is to remove at the time of operation as much of the exudate as possible, and to provide means of facilitating drainage. I have been through all kinds of experiences, from simple incision of an abdomen bursting with pus, to the doubtful infections of an early perforation. I have seen at the Massachusetts General Hospital a great variety of practice, original and copied. I have employed, one after another, simple incision with permanent drainage; careful mechanical wiping with and without irrigation; extensive packing with large gauze masses; extensive drainage with wicks — all through a single incision; multiple incisions with large packing, and with small, and with multiple wicking; constant irrigation through multiple incisions and through single; all methods of irrigation and many different solutions. I have treated general peritonitis of appendicular origin with no operation, following as nearly as I knew Ochsner's method. The result of all this experience, in hundreds of cases of my own and in thousands of cases at the Massachusetts General Hospital, is, in my practice, as follows:

The incision is made over the appendix along the outer border of the rectus. It is at first three or four inches in length. Later it may be extended upward and downward as the exigencies of the

lesion indicate. The moment the peritoneum is incised, the extent and nature of the process may be inferred with reasonable accuracy. If there is an abundant free exudate, whether it shows the gross signs of bacterial infection or not, care must be taken to remove this exudate at thoroughly as possible before searching for the appendix. I extend the incision sufficiently to put above, below, and toward the left, plenty of gauze masses, for the purpose not only of absorbing the fluids but of protecting the intestines from further and perhaps more virulent contamination — or, should the exudate prove sterile, from any contamination whatever. In a word, I employ the same technique as that already described, except that the main purpose is immediate absorption, and the secondary, protection. If the fluids soak thoroughly the gauze masses, these are replaced by dry. It is well, in placing the large gauzes, to have a portion of them at least in the right flank and in the pelvis. It is hardly practicable or advisable at this time to thrust the gauze so far as the left flank. The position of the appendix is now located by the most careful digital search for limiting adhesions, if any exist. In many cases of general peritonitis there will be no such adhesions, but the appendix will be floating free among the small intestines. In other cases the appendix will be in the midst of recent adhesions, some of which have given way. At other times there will be a half-emptied abscess. Be these things as they may, the appendix is next delivered from its surroundings, whether adherent or not; and the entire procedure is accompanied by as careful control as possible of the liberated fluids, if any there are. The appendix and stump are treated as in acute appendicitis with general infection. The gauzes, heavy with absorbed fluids, are now removed and fresh ones are substituted. Gauze may now be packed in all directions — in both flanks, in the pelvis between the folds of the mesentery. This manner of removing the results of general peritoneal infection should be continued while the steps essential to the operation are being taken, until closure of the wound makes the final removal of the gauze necessary. I use uncovered gauze wicks for drainage — one at the appendix stump, one or two in the pelvis, and one in the right flank. Sometimes I place one in the centre, among the folds of small intestine and mesentery. If additional wicking should appear desirable in distant parts of the abdomen, I prefer additional openings,— in the left flank, the left lower quadrant, or the right flank.

When the intestines are paralyzed, I sometimes open the colon and drain through a tube, using the Mixter tube for that purpose. I do not think colostomy of great value. When peritonitis is beginning, it is not necessary; when peritonitis is fully established, it does little if any good; when there is complete intestinal stasis, it drains only the presenting paralyzed coil. I have used the colostomy for the injection of salts and other solutions and for free irrrigation. At the present time I seldom, if ever, use the method. The subsequent treatment of general peritonitis consists in attempts to empty the bowels by enemata, massage, calomel, and other cathartics. In regurgitant vomiting, I wash out the stomach, and keep up the strength as much as possible by rectal feeding. I have at times used the postural treatment of the late Dr. Fowler.

Improvement in the results of operation for general peritonitis lies chiefly along the lines mapped out in the very beginning — namely, those of early diagnosis and early operation. I see to-day little improvement in results by any method of treatment, if the task is undertaken after distention has overcome rigidity, when through intestinal paralysis there are no evacuations downward, and when — worst of all — there is constant regurgitation of dark fluid from the stomach, duodenum, and ileum.

In the earlier attacks, on the contrary, I see by present methods a very great improvement in results. When there is rigidity and tenderness, without distention, before the bowels have become paralyzed or vomiting regurgitant, the mortality has become enormously reduced.

In the treatment of localized abscess, my custom is simply to drain, unless it is clearly feasible to remove the appendix without too extensive manipulation and too great danger of spreading the infection. The walled-off abscess which I drain is an abscess of two or three or more weeks' duration. The adhesions are so firm that they cannot be easily separated by the fingers. The appendix is buried out of sight, and its separation demands an instrumental dissection.

The field is necessarily contaminated by abundant pus and blood. Often the appendix has disappeared entirely, and is sometimes found as a soft slough, usually escaping with the evacuation of pus. If the abscess is small and not adherent to the abdominal wall, I carry out the plan already described; if it is adherent to the abdominal wall, I always content myself with drainage; if the abscess is large and extra-peritoneal drainage is practicable, I always drain, sometimes even through the rectum without making any search for the appendix.

The pus escaping from a large abscess should be collected in a basin, or allowed to strain through gauze, where any sloughs will be shown. These

sloughs should be floated out in water, because there may be remains of a sphacelated appendix, the discovery of which will make further search unnecessary.

After complete recovery from the operation of simple drainage, the patient may be advised to submit to removal of the appendix, especially if there is the least weakness of the scar, or if there are any symptoms of discomfort.

In my earlier experience, when I drained much more frequently than I do now, without removal of the appendix, I found not a few cases in which a second and severe attack followed. In one or two instances the second attack was, I am told, fatal. The idea that the appendix is usually cast off with the pus is erroneous, though there is no doubt that this is sometimes the case. The appendix removed in the early hours of the attack is in many cases so evidently necrotic throughout, that its total sphacelation, should an abscess form and the patient live, is inevitable. I do not know what percentage of appendices are in my cases thus totally gangrenous, but it is a considerable one.

When, deeply situated in the pelvis, there is an extensive abscess which can evidently be drained through the abdomen only with difficulty, but through the rectum with ease, it seems to me common sense to drain through the rectum. Most if not all patients thus drained recover, and safe removal of the cause is then possible later. I would not thus drain an abscess which could be as safely drained through the abdominal wall.

In chronic appendicitis in the history of which there has deen no sepsis, and in which no tumor can be felt — in which there is good reason to suppose that the appendix is free — I make a short, muscle-splitting incision. When there has been, in the previous attacks, undoubted sepsis and localized peritonitis, I make an incision along or through the right border of the right rectus. It is simply a question of easy elongation of the incision.

When the appendix is found buried in a mass of adhesions, the gauze walling is employed as already described in acute appendicitis without general peritonitis, for in not a few cases pus will be found, even if there is no constitutional evidence of its presence. The appendix is treated as in acute appendicitis. When there is any suspicion of infection, I always use a small protected gauze wick, which I remove at the end of one, two, or three days. When the appendix is intact, whether buried in adhesions or freely movable, I tie it near the cœcum; then tie and cut its mesentery. The appendix is next burned off with the platinum cautery near the ligature; its stump is depressed into the cœcal wall and held there with a pursestring suture or interruped sutures of fine silk.

In many, if not most, cases of appendectomy in the period of health, the appendix is removed not because there has been a severe and unmistakable attack with perforation and localized peritonitis (for such cases, in this community, at least, demand and receive operation in the acute stage), but because there have been numerous attacks of appendicular pain, mild in character and brief in duration, with evanescent but unmistakable tenderness — all of which symptoms are usually unattended by constitutional disturbances. In some cases, as the operation demonstrates, the interior of the appendix will be found affected, often distended with pus, without involvement of the appendicular wall.

The probability of there being no infection of the peritoneal wall — of there being, in fact, only slight changes in the appendix and those all internal — can, I think, be accurately determined beforehand by the experienced observer. When such a condition is probably present, I make a very short incision.

In removing the appendix in health, we are striving for absolute safety as to both immediate and remote results. We are dealing in the fraction of one per cent of mortality. We must consider, therefore, complications of the rarest and most inexplicable sort, as well as those of the commonest and plainest. The length and kind of incision acquires, therefore, a considerable importance.

The advantages of a short, intermuscular incision seem to me so obvious that they need hardly be mentioned. There is, first, the avoidance of exposure, and therefore a lessening of the chances of infection, if the bowel is not drawn out of the incision and kept there throughout the steps of tying-off and removing the appendix and of burying the stump. Indeed, in the model operation nothing whatever is withdrawn from the abdominal cavity except the appendix itself and enough of the cœcum to permit treatment of the stump.

Secondly, the short, intermuscular incision makes the liability to hernia excessively small. It is, indeed, hard to conceive of a hernia through the scar of this incision.

The disadvantage of the short cut lies, first, in increased technical difficulties of finding and removing the appendix; and secondly, in the limited opportunities for digital examination of the abdominal viscera. The first disadvantage is a serious one, and the short incision should not be attempted except by the skilled operator. Moreover, the short incision should not be used in the later steps if the least difficulty is met with.

The second disadvantage is common to all incisions which do not admit the hand, or at least the four fingers. It is in my judgment unjustifiable to make a cut long enough to admit the hand unless there is serious doubt as to the diagnosis, in which case the cut should be made in the median line. My practice varies with the thinness of the abdominal wall, the perceptibility and probable mobility of the appendix, and with the sex.

When the abdominal wall is thin, I make a cut that is absurdly short, but long enough to open the abdomen by the McBurney method, and with the patient in a very moderate Trendelenburg position, long enough for inspection of the right iliac fossa. My assistant is ready with the toothless forceps to grasp the appendix when it is brought into view by my manipulations with narrow retractor and "pusher" (a blunt instrument used for returning intestines to the peritoneal cavity through short incisions, hernial rings, etc.).

If the appendix is not seen and grasped, the cœcum is caught between thumb, fingers, and gauze, and withdrawn. If with the cœcum the appendix base can be easily delivered, a silk suture is applied about the appendix close to the cœcum, which is itself then returned to the peritoneal cavity, with the appendix if necessary. The appendix base is next pulled out of the wound by means of suture ends, which were for this purpose left long. The whole appendix follows, and is easily delivered, with its mesentery. Nothing is now exposed to the air except the appendix and a part of the cœcum. The meso-appendix is tied, usually with silk, in sections, the appendix is burned off close to the ligature, and the stump is depressed and buried in the cœcal wall. The time of exposure is generally less than fifteen minutes, including suture of the wound.

The error in this method consists in trying to find and remove an appendix so deeply situated and so firmly attached that it cannot easily be delivered. The experienced operator will enlarge the incision the moment it becomes evident that the manipulations will be other than of the easiest possible sort.

If the the appendix is adherent, as shown by the finger (this incision will barely admit one finger, and often not beyond the second joint); if traction on the caput cœci is not followed by delivery of the base at least of the appendix; if the base having been delivered and tied, the rest of the appendix hangs back with its mesentery — it is folly to proceed without enlarging sufficiently the incision.

When there is a perceptible mass, I make a right rectus incision; so also when there is a suspicion of right salpingitis or ovarian disease; and so, finally, when there is any suspicion of gallstones. If, for example, there is reason to suspect gallstones, as there is when the symptoms are high up in the right side, I make a rectus incision halfway between the gall-bladder and McBurney's point, so that the cut may be enlarged upward or downward, as the digital demonstration may indicate. In such cases the original cut is necessarily long enough to permit the accurate determination of the lesion.

If too short incisions are for any reason to be condemned, so are those that are too long. I see occasionally the scars of "interval" operations that are six or eight inches long. As it seems to me, such length of cut is not needed, even by the tyro. On the other hand, the short incisions made by the technique which I have been asked to describe, are never to be used by the inexperienced surgeon. In the hands of those who have used a gradually shortened cut, this method of procedure is one of great value to the patient. I cannot view with complacency extensive exposure of intestines in a bloody field; for I gauge the dangers in clean operations largely by the chance of infection from the air, the breath, the scalp, the perspiration, and other possible sources. Admitting always the minuteness of the danger, I can nevertheless, in imagination, conjure up risks in an operation when there has been no exposure beyond that of a small portion of the cœcum with the appendix.

In many cases the appendix will be embedded in an inflammatory mass. Probably most operators have found out for themselves how the appendix may be teased out of such a mass, by leaving behind the adherent peritoneum, as the muscular and mucous layers are unsheathed from the mass. This method of dealing with an appendix, used now for many years at the Massachusetts General Hospital, obviates the extensive and bloody dissections necessary to separation of peritoneal surfaces from peritoneal.

In all operations on the appendix I take the greatest care to have absolute hemostasis, not only because I have known of deaths from hemorrhage, but because blood is so fertile a soil for infection.

In all clean cases I sew the abdominal wound with through-and-through silkworm-gut sutures and buried silk. The silkworm-gut sutures are first applied. These are held taut by an assistant, lest, while the buried sutures are being applied, a piece of intestine or a bit of omentum get entangled in the intra-abdominal loops. In septic cases I use chromicized catgut or other slowly absorbable ligature, for in my opinion simple catgut is too quickly absorbed to withstand safely the occasional coughing, sneezing, and vomiting to which every convalescent is liable.

THE TREATMENT OF POSTPARTUM HEMORRHAGE WITH A NEW METHOD OF HEMOSTASIS

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One of the most valuable assets in the equipment of the obstetric physician is the skill to treat successfully the flooding of the parturient patient. This ability is especially noticeable when, without apparent warning, such a profuse hemorrhage occurs as may result fatally to the mother unless immediately arrested. While the severe form of postpartum hemorrhage is fortunately becoming more rare, due to the greater skill in prophylaxis, nearly every physician can recall cases whose unsatisfactory termination testifies to the seriousness of this complication in its graver forms. In spite of the great "respect" of many physicians for this *bête noir*, the treatment or postpartum hemorrhage in the hands of obstetricians has robbed it of its terrors, and but relatively few patients are lost thereby. In fact, the two principal complications, from the specialist's point of view, are rupture of the uterus, and septic infection. Postpartum hemorrhage has been relegated to that class of cases which is largely preventable, and under skillful and immediate treatment will yield satisfactory results. In the true type of postpartum hemorrhage the mother possesses at the beginning of the bleeding nearly all the blood that she did at the commencement of labor, and is in a great deal better condition to withstand the loss of blood than if her vitality had been already seriously drained because of a premature separation of the placenta, or a placenta prævia, in which cases considerable hemorrhage would result from justifiable efforts to save the child's life. The fact that every practitioner meets with more cases of bleeding in his early years of practice proves in great measure the value of prophylaxis in this condition, and we will find that the medical attendant who is conscientious and careful in his management of the three stages of labor, will rarely be called upon to treat severe cases of postpartum hemorrhage in his private practice.

Not much can be done in the later weeks of pregnancy to guard against bleeding in labor, except to build up the general strength of the patient, and to fortify her vitality against any and all of the obstetric complications. The amount of blood is normally increased during pregnancy, to compensate for an expected loss, and the fibrin element is increased to guard against an undue hemorrhage. This clotting power of the blood may be increased by the administration of calcium chloride in small doses, and by the ingestion of gelatine in the form of pudding two or three times daily for six or eight weeks prior to the onset of labor. This treatment may be given to hemaphilics or in patients who may have a history of bleeding in previous labors. A peculiarity of hemaphilics often consists in a minimum loss of blood during labor, when the past history has been provocative of great misgivings. In one personal case, with a history of two former floodings, scarcely six ounces of blood were lost.

If the patient gives a history and presents evidences of an endometritis before the advent of pregnancy, we may lessen the liability of adherent placenta by an efficient curettage, which operation may be repeated once or twice, and by the administration of the bichloride of mercury; but, if pregnancy occurs before a cure is effected, we must be on our guard during labor for this common cause of postpartum hemorrhage. The presence of tumors, such as fibroids or carcinoma, in the uterine wall, which interfere with muscular retraction, or adhesions or malpositions of the uterus, especially due to a former anterior hysterorrhaphy, will naturally predispose to flooding. We should endeavor to rectify all the diseases or defects in a patient's system that have a tendency to complicate the delivery or the lying-in period. Pregnancy nearly always magnifies these defects and calls our attention to their presence in a not uncertain way, and a careful study and judicious treatment of the patient's condition up to the advent of labor will well repay the effort, not only in the prophylaxis of hemorrhage, but of many other complications as well.

As labor occurs, the efforts of the attendant are directed toward maintaining a normal standard of labor by preventing, as far as possible, all the complications, and in terminating the delivery before the mother or baby become exhausted. A very important point in prophylaxis is the normal duration of labor. It is true that labor is not a phenomenon that is to be measured by the tick of a watch or the hands of a clock. What may be normal for one patient may be too long or too short for another. The indication for hastening or retarding the accouchement must always be the physical condition of the mother and child, and the ability of the

one to deliver the other without danger to the health or life of either. The skillful observer will diagnose, at an early period of time, the inability of the mother to effect a spontaneous delivery, and will interfere at once, for any further delay is borne at the expense of both patients. It goes without saying that each minute of the second stage of labor taxes the vitality of the mother to a certain extent, and this is especially to be avoided when her strength is beginning to weaken.

If an arbitrary estimate of the length of a normal second stage were to be made we would say that the best efforts of the uterus are expended during the first three and a half hours in a primipara, and two and a half hours if the mother is a multipara, and that during this time watchful expectancy should be the rule unless some indication arises calling for the rapid termination of labor. A prolonged second stage is a frequent cause of atony of the uterus and is to be avoided under all cricumstances.

While a major portion of the strength of the uterine muscle is expended in effecting delivery, considerable force is also necessary to obtain firm contraction and retraction postpartum, and this reserve should not be needlessly drawn upon. It is, therefore, necessary in all labors to correct any malpresentation or malposition, to obtain the proper mechanism in the given case, to avoid complications as far as possible, to operate at the right time and in the right way if interference is called for, and throughout the entire period, to sustain the patient's strength and vitality.

The liability of postpartum hemorrhage begins at the moment of delivery, when the uterus puts forth its final effort to expell the fœtus from the birth-canal. It is rare, however, to see much bleeding immediately after delivery, except from lacerations of the maternal soft parts. At this time, the placenta is everywhere adherent to the placental site, and hemorrhage from that source is impossible. This period of watchful expectancy enables the attendant to again inspect his apparatus and to supply any deficiency therein. After delivery, the patient should lie in the dorsal position, and the sterile gloved hand should be placed over the fundus, a sterile towel having been previously placed over the abdomen, with the fingers posteriorly, and the thumb anterior to the uterus. The fundus at this time lies near the level of the umbilicus, and if good contractions are present the outlines are distinct. While in all cases of uterine relaxation with hemorrhage the outlines are indistinct, the uterus was firmly contracted at the moment of delivery, and at that time the external hand could outline its contour. Subsequent to this primary condition, the uterus may relax and be lost in the abdominal cavity. During the early part of the third stage, the hand should merely rest over the fundus and keep watch of the uterine outline. Massage is contra-indicated. This time is valuable, because the uterine sinuses are being filled with blood-clots that become firmer the longer the process is allowed to continue without being interrupted. Massage at this time serves to loosen the clots from the sinus walls, and favors their expulsion later with resulting free bleeding. Massage of the fundus of the uterus easily excites contraction, and placental separation begins to occur. When the placenta is separated from the uterine wall, the fundus rises in the abdomen from four to six centimetres, and after complete expulsion reaches from ten to fifteen centimetres above the symphysis pubis. This primary rise of the uterus, due to the expulsion of the placenta into the lower uterine segment or lower parturient canal, should not be hindered nor interfered with, as it is purely a physiological process. This condition is to be differentiated from the rise of the uterus from retained placenta and internal hemorrhage, by the advance of the funis at the outlet and by the difference in the outline of the fundus. In the normal process the outlines are distinct, the uterus is flattened from before backward, and the organ tends to resume its triangular form; while in the presence of hemorrhage the outlines are more indistinct, the form is globular, and the walls are less firmly contracted.

After the cord has been divided, an examination of the lower birth-canal can be made while awaiting placental expulsion. Lacerations of the perineum, if small, may be sutured at this time, but the sutures are left untied until after the placenta is removed. Lacerations of the vaginal walls, especially if posterior, may bleed moderately; also tears around the clitoris and urethra. These may be controlled by sutures. Hemorrhage from lacerations of the cervix and lower vaginal tract are easily diagnosed by appearing while the placenta is still adherent, as well as later, so that the first bleeding that occurs within ten or fifteen minutes postpartum comes from tears of the maternal soft parts, in the great majority of cases.

Tears of the cervix may extend so deep as to reach the base of the broad ligament and involve the uterine artery. These deep tears are rare, and are usually caused by a forced extraction when the cervix has not been fully dilated or effaced. In some cases, it may be possible to palpate the uterine artery almost stripped from its surrounding tissues. Hemorrhage from cervical lacerations can be diagnosed from that coming from the uterine cavity, by its appearance externally while the

Author's method of arresting sudden postpartum hemorrhage.

uterine body is firmly contracted, while in the latter case, the bleeding appears internally only during relaxation of the muscular fibres and is then expelled by the contraction. After the contraction has emptied the cavity, no further blood is lost until relaxation takes place. The degree of hemorrhage from cervical tears depends upon the extent of the injury, and also the proximity of the placenta. In placenta prævia, by reason of the presence of the large, open uterine sinuses, a moderate laceration might cause serious hemorrhage. The usual treatment of lacerations of the cervix of any extent is by suture. If a large artery is severed, it is practically impossible to secure both ends of it by a ligature, because of the tumified condition of the tissues and the retraction of the vessel walls. The best we do is to suture the edges of the tear together and trust to a compression of the vessel walls by the surrounding tissues. If the arterial tension is high, there is danger of a hematona forming in the parametrial tissues, especially the broad ligament, which may rise as high as the navel. The vis a tergo forces the blood out into the loose connective tissue since its escape externally is prevented by the sutured cervix. In many cases, therefore, better results in cervical tears may be obtained by tamponade.

The treatment of hemorrhage from rupture of the uterus is included in the treatment of the rupture itself. The source of the hemorrhage is from the placental site and the injury itself, and is, according to Eversmann, identical with postpartum hemorrhage after the delivery of the fœtus. In only about twelve to fifteen per cent of the cases does the blood come from the uterine artery. After the fœtus is extracted, through the natural passages if possible, the bleeding vessels are clamped if the tear is low and easily accessible. Otherwise tamponade of the tear is to be performed at once. If the parametrium is opened, it should be tamponed also. In anterior tears, the uterus may be forciby anteflexed against the os pubis, and a vaginal tampon inserted. In posterior tears, fixation in retroflexion is a valuable procedure. If tamponade fails to act properly, laparotomy may save the patient's life.

A question of importance is: How long should we wait for the spontaneous expulsion of the placenta? It is apparent to all that, unless adherent to the uterine wall, we should wait until it has been expelled into the lower uterine segment or vaginal tract, providing no hemorrhage occurs. It is useless to wait for a complete spontaneous expulsion when the placenta lies practically outside of the uterine cavity. Ahlfeld advises watchful expectancy for at least one hour and a half postpartum, and claims that in eighty per cent of cases the placenta will be expelled spontaneously, while in the remainder early expression is necessary. The patient lies on her back with the limbs adducted, and sterile wadding, placed under the hips, absorbs the hemorrhage. This pad is inspected at frequent intervals. The hand is applied to the fundus externally to control any marked relaxation. The placenta is here used as a tampon to prevent hemorrhage, and to a slight extent to prevent entrance of micro-organisms.

The method that is more generally used, and one that is just as effective as Ahlfeld's in preventing hemorrhage, is the Credé expression. This method should not be used, in the absence of hemorrhage, until the placenta has been separated. Credé's expression is intended primarily to expel a separated placenta into the world, and not to separate it from the uterine wall. If the placenta is adherent, a few attempts are advisable before resorting to manual removal. The great majority of placentæ separate in the first half hour, as is shown by the rise of the fundus and the advance of the cord. Shauta found, in a series of one hundred cases, the placenta to be lying in the vagina after waiting from twenty to thirty minutes in ninety-nine. It is, therefore, good practice, in the

absence of hemorrhage, to wait half an hour for placental separation, and then perform early expression or the Credé operation. If a partial separation occurs with hemorrhage, an early expression is to be attempted. A contraction of the uterus is best obtained by circular massage of the fundus. When contraction results, an attempt may be made to expel the placenta. If unsuccessful, the process may be repeated every four or five minutes, for a time. If severe hemorrhage ensues, an immediate manual removal of the placenta membranes and blood-clots is indicated.

Another cause of postpartum hemorrhage from the placental site is atony uteri. Ahlfeld claims that atony uteri is a rare cause, and that the frequent cause is a partially detached placenta: while, on the other hand, Schauta and Bumm claim that atony uteri is the most frequent factor. We may expect this condition in precipitate labors, in rapid deliveries where the fœtus is extracted from the uterine cavity in a very short time, in multiple pregnancy, in hydramnion as well as in a too early placental expression. After delivery of the fœtus, the sinuses and vessels remain open and relaxed, and serious hemorrhage occurs. In other cases, the uterus may contract well for a time but subsequently relaxes with free bleeding.

The diagnosis of this condition can be made externally by the hand lying on the uterus. In uterine relaxation, the outline is indistinct and it may be difficult to distinguish the organ from the other abdominal viscera. At times, during the contraction, the outline becomes distinct but as relaxation comes on its definition is again difficult. If, on the other hand, hemorrhage occurs when the uterus is hard and well contracted, with its outline distinct, and its size and form normal, atony uteri can be excluded and some other cause for the hemorrhage investigated.

At times the entire uterine wall may be firmly contracted but the placental site is found to be relaxed. In favorable cases, a hollow or indentation may be felt in the uterine wall over the placental site. This "paralysis of the placental site" is caused by the great development of sinuses and vessels in a portion of the uterine wall where the musculature is weak or poorly developed.

Another form of hemorrhage may be met with in cases where the uterine cavity is filled with blood-clots. The placenta with its membranes has usually been completely expelled. Externally, the uterus reaches a little higher in the abdomen on account of the contained clots. The organ is felt to contract and relax alternately, but it is noticeable that the walls are not as firm as they normally should be during a contraction. A small stream of blood flows externally. The peculiarity of this hemorrhage is its persistency, frequently lasting for three or four hours unless treated, and consequently draining the patient's strength. The uterus is unable to close down its sinuses and vessels because of the presence of blood-clots, and hence the indication is to clear out the uterus and further hemorrhage will be avoided.

Still another form of hemorrhage, which is fortunately rare, is due to a sclerosis of the uterine vessels preventing retraction of the muscular walls. It is a well known fact that sclerosis of the vessels can occur at this period of life, even from twenty to thirty years of age, and is frequently associated with nephritis. In such cases a severe hemorrhage can occur while the uterine walls are firmly contracted. A uterus of this character is recognized at post-mortem by its rigidity and the gritty feeling when cut with a scalpel. While these cases are rare, they should be kept in mind in obscure cases of hemorrhage.

The mere fact that we are uncertain in a given case, how much blood a woman can lose in labor without detriment to herself, places her medical attendant under obligation to save as much blood as possible. While the limit in normal labor is placed by many authors at from 400 to 500 grammes, a smaller loss has a more pronounced effect on some patients than a larger amount has on others. Women in the lower walks of life, who are accustomed to outdoor life and manual labor, can frequently withstand the loss of a quart of blood without any apparent effect whatever, while those patients of a more nervous and delicate organism are susceptible to much smaller losses. The most important point in the treatment of postpartum hemorrhage, is to avoid wasting time and blood by trying many of the minor methods of hemostasis. It is much better, and decidedly more scientific, to treat the case efficiently, when the pulse is near 90 or 100, than to experiment with questionable procedures until the pulse runs up to 140 or more before effective measures are taken. The criticism is made that often the milder methods succeed in arresting the bleeding and the tamponade is unnecessary, but it is impossible to know beforehand whether the milder measures will suffice, and if they are persisted in and fail, much has been lost. Effective measures are harmless if done at the right time, and with the proper technique but in order to be really effective, they should be tried before the patient's strength is weakened through a great loss of blood. He is a poor surgeon who will trust to arresting hemorrhage by syncope rather than to controlling it by efficient methods of hemostasis at the time of onset.

The treatment of postpartum hemorrhage depends upon the source of the bleeding and its severity. Little time need be spent by the observant attendant in finding the source of the hemorrhage. If the placenta is retained it should be removed. If upon inspection a portion of the placenta, or a portion of the membranes as large as a man's hand, are missing, or if there is any doubt as to whether the uterus is emptied or not, the hand should be re-introduced into the uterine cavity and palpate the surface and bring everything away. If there is no laceration of the soft parts, if the placenta and membranes are intact, a profuse hemorrhage indicates the presence of atony uteri, and the placental site is the origin of the bleeding. If necessary, visual inspection of the cervix may be made with the speculum, and the blood seen to issue from the external os, but this procedure is seldom necessary, as the cervix is low down on the pelvic floor and can frequently be seen externally. In this variety of hemorrhage, many methods of hemostasis have been recommended, generally inefficient and dangerous, in that valuable time and blood are lost in attempting to carry them out. The first procedure is massage of the uterus. If that organ has been lost in the abdominal cavity, it should be found and brought into the median line and briskly massaged. The effect of a full bladder in forcing the uterus up into the abdominal cavity and predisposing to hemorrhage, is well known, and this organ should be emptied if full of urine. In severe cases the uterus may reach up to the level of the ribs, filled with clotted and fluid blood. As this blood is lost to the maternal circulation, and further as its presence in the uterine cavity prevents retraction, the whole mass should be immediately removed. If this cannot be done by the external expression, the gloved hand should be passed internally and the uterus emptied.

In a great many cases this procedure will arrest the hemorrhage, but, if the atony persists, there is nothing to prevent a further relaxation and flooding. In atony uteri, the organ lies in the pelvis like an empty sac, its walls are soft and offer no resistance to the hand. The fundus is more easily recognized by the internal hand because its walls, above Bandl's ring, usually measure about three centimetres thick, while the lower uterine segment and cervix may only measure a half centimetre in thickness. The uterine arteries are pouring the blood into the uterine sinuses, and are markedly enlarged and tortuous in their course. It is at this time comparatively easy to force the fundus down into the cervix, or lower still, by external pressure. It is in this class of cases that the author has tried with great satisfaction a method of hemostasis which he has not yet seen mentioned in the literature. As the patient is bleeding profusely at this time, something must be done immediately. It is taken for granted that the hands are sterile, as it should be a routine method to keep them so for at least fifteen minutes after the placenta is expelled. A sterile towel should be placed over the abdomen, or if this is not at hand a laundered towel, soaked with a 1 to 1,000 solution of corrosive sublimate, acts as a good substitute. Now the external hand grasps and firmly kneeds the fundus and presses it down into the inlet. The other hand, incased in a sterile glove, is passed into the vagina up to the cervix. The fingers then attempt to seize as much of the cervix and lower uterine segment as possible, and the hand is forced far into Bandl's ring until the fundus is reached. The internal hand remains outside the uterine cavity throughout the operation. If sufficient pressure be used the internal hand can be forced well into the fundus and past the contraction ring, pushing the cervix and lower uterine segment before it against the walls of the fundus. This obliterates the cavity of the uterus, and brings direct pressure and compression to bear against the sinuses and open vessels. The position of the internal hand or fist in the fundus, yet outside the uterus, has a marked effect in stimulating contraction, especially when aided by brisk massage. One explanation of the efficiency of this method of hemostasis is the fact that most of the blood is carried into the uterine walls by the uterine arteries that run up to the fundus along the lateral walls. By inverting the lower portion of the uterus into the upper, direct pressure is brought to bear by the hand against these arteries and the supply of blood is in great measure shut off. As soon as a contraction comes on, the hand is forced out of the fundus and the uterine cavity is re-formed, but by reason of the retraction, hemorrhage will not recur. If relaxation ensues, the method may be repeated. This position of the uterus is only possible when atony uteri exists, and is useful in suddenly arresting a serious hemorrhage. The author has in several cases been enabled to completely arrest a profuse hemorrhage. If the arrest of hemorrhage is in great part obtained and the uterus contracts poorly, an intra-uterine douche of hot (115 F.) one per cent lysol solution is given. The douche stimulates the walls and causes them to contract with greater energy. Its use should not be persisted in if there is no immediate effect, as prolonged heat favors relaxation. Cold water is dangerous as it produces too much shock.

If the bimanual compression and the douche produce only temporary hemostasis, further delay is dangerous and recourse should be had to the

utero-vaginal tamponade, as suggested by Dührssen. Pressure on the aorta, douches with various chemicals, electricity and such measures, belong to the period of the long ago and should be dispensed with. In the great majority of cases, a hemorrhage can be effectually controlled by tamponing, and the tampon should be inserted when the pulse is increased twenty beats or more. Before using the tampon it is imperative to know that the uterus is empty, as a tamponade with portions of retained placenta is worse than useless. The equipment of every physician should include five yards of sterile or lysol-gauze for this purpose. While the hemorrhage is held under control by the bimanual compression method, two fingers of the internal hand may be passed into the uterine cavity and the gauze packed firmly by a long pair of uterine dressing-forceps. In case of emergency the packing may be done by the internal hand alone. The entire birth-canal should be tightly packed. It is better to use the gauze dry as it packs easier. By this method, septic material may be carried by the gauze into the uterus from the vagina and vulva. The danger of infection can be avoided, however, by drawing down the cervix by volsella to the outlet, and packing it under visual inspection, or by using the uterine pack devised by R. W. Holmes, where the gauze is forced through a large tube reaching to the fundus by a toothed piston or ramrod. By this latter method, the gauze is not contaminated by contact with the soft parts. A tampon, well applied, seldom bleeds through to any extent and may be left in for 16 to 20 hours. It is a rare occurrence for the flooding to commence after its removal.

The presence of a well-tamponed utero-vaginal tract is not an absolute safeguard against hemorrhage, as the uterine walls may still further relax and a blood-clot may form on top of the tampon. This is apt to occur if a placental cotyledon is adherent. It is, therefore, necessary to keep the uterine wall in firm contact with the tampon. This should be done by manual pressure, by a towel folded in a semicircular form so as to surround the fundus and placed beneath a firm abdominal binder, or the "rational" Fritsch binder may be used. In the latter case, the uterus is brought into a position of forced anteflexion in the median line. A bandage about twelve inches wide, by passing over the posterior and superior portion of the fundus, maintains this position of forced anteflexion. The tails of the bandage are long enough to encircle the thighs and be fastened over the groins. If the tamponade has been improperly introduced, and especially if it has failed to fill the fundus, the blood may saturate the gauze and appear externally. This has happened in the clinics of Dührssen, Fritsch, Ohlhausen, and other authorities. A bleeding tampon is useless and should be removed at once. A second tampon should then be introduced and care taken to fill the entire uterine cavity. The tampon is to be left in for eighteen to twenty-four hours, and it is very rare to see any free bleeding when removed at this time. If the second tampon bleeds through, and the patient is found to be getting weaker, a laparotomy may be necessary to save her life; but these cases are exceedingly rare. A hysterectomy may be indicated.

Kocks has devised a method for arresting hemorrhage in these cases by an artificial inversion of the uterus. The method is also recommended by Shauta. The fundus uteri is inverted into the vagina by pressure downward through the abdomen. This is fairly easy in cases of atony uteri. A strip of gauze is then tied snugly around the inverted portion just above the placental site. The constriction controls the bleeding. The gauze is removed in seven hours. Kocks claims that the gauze may be re-applied for another seven hours if necessary, but prolonged pressure is apt to result in gangrene. This method may be used when the patient is away from a hospital, and where the surroundings are not conducive to a well regulated operation.

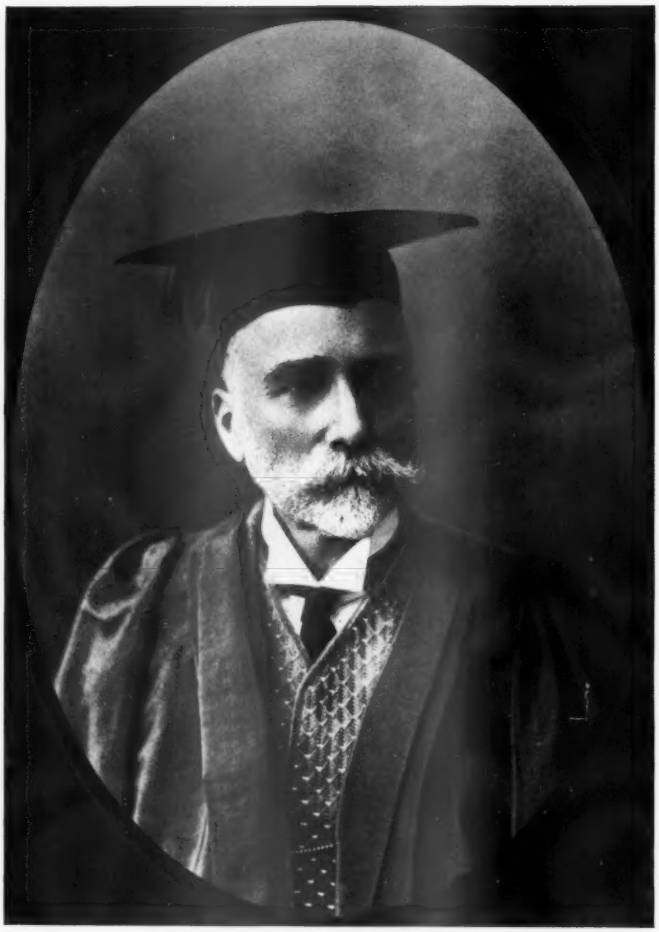
Briesky's forced anteflexion of the uterus is another valued means of hemostasis. The fundus is brought as far forward as possible externally, while the cervix is forced anteriorly by the internal hand, and the uterus flexed around the symphysis pubis. The uterine cavity is obliterated and the walls are directly compressed. The difficulty in this method is in forcing the fundus forward, but if there is sufficient diastasis of the recti muscles the method may be very successful.

When the hemorrhage has finally been arrested, the physician should satisfy himself as to the degree of acute anæmia resulting. This is generally interpreted by the rapidity of the pulse, its quality and tension, the effect on respiration, the color of the face and hands, the ability to retain body heat, and the effect on the consciousness. The weight of these various points is far greater than the actual quantity of blood lost. A patient suffering from acute anæmia is particularly predisposed to subnormal temperature, and to avoid this she should be kept warm by flannels, blankets, and hot-water bottles. Stupor or unconsciousness which is caused by anæmia of the brain and the deficient arterial tension in the heart and arteries, may be in part relieved by elevating the foot of the bed from one to two feet, so that gravity will assist in the return circulation. Bandaging the extremities,

beginning from the hands and feet and extending to the trunk, is valuable in forcing the blood into the vital centres, where its presence is most urgently required.

It is a well known physiological fact that absorption and assimilation are held in abeyance when the tension of the blood in the vessels gets below a certain point. If the tension is below this point, the injection of drugs or their administration by the mouth is futile, as they merely lie as inert substances in the tissues or stomach. The immediate need of the system is to raise the arterial tension or blood pressure in the vessels. If the patient is in a grave condition, this is best done by the intravenous injection of blood from another person, or of the normal salt solution (.6 per cent). This immediately raises the pressure, and it is gratifying to notice the effect on the patient's general condition. In anæmia of a milder type, the retromammary transfusion of normal salt solution may be substituted. From one to four pints may be injected behind each breast during a period of one to two hours, depending upon the rapidity of absorption. The oft repeated request of the patient for water may be granted, provided that she has no emesis. Patients are frequently able to absorb considerable fluid from the stomach by this method. Rectal injection of hot salines is an adjunct to the transfusion, keeping up the temperature and adding to the quantity of blood. The return of color to the lips and fingers, and the disappearance of that peculiar and dreaded ashen hue of the face that precedes dissolution, affords the physician the most happy experience in the entire practice of medicine. The increased warmth of the body, the improvement in rate and quality of the pulse, and the return of consciousness and complaint of after-pains, or the wounds in the breast, follow the filling up of the depleted vessels and heart, and at this time, when absorption becomes more active, hypodermic injection of drugs is indicated. The injection of ergot may be given as soon as the placenta is expelled, in anticipation of bleeding. It takes from fifteen to twenty-five minutes to become effective. The drug from which we may expect the most immediate effect is camphorated oil. This should be kept sterilized and ready for use. A syringeful is a dose and it may be given three or four times. It acts within five minutes and is rarely followed by local irritation. The local use of ether, or alcohol in the form of brandy or whisky, is inferior to the camphor oil and is more apt to cause abscess or pain because of its action on the tissues locally. Together with the camphorated oil, it is well to inject 1/30th grain strychnine nitrate, so that its action will become manifest when that of the camphor wears away. The entire stimulation from this time on may be effected by strychnine or digitalis. It should be remembered that an obstetrical patient who has a pulse of 140 beats per minute, is in a far greater danger than a surgical case with the same kind of pulse, and therefore she is to be watched carefully or left in the care of a trained assistant until the danger is past. Another point is the susceptibility of these patients to infection, and to the great activity of absorption when once that function has been completely restored. The need of asepsis and antisepsis in these cases need not be mentioned at this time.

In conclusion, the attending physician will carefully study his patients, and fortify them against all the complications of labor to the best of his ability. During labor itself, he will attempt to keep the process normal as to mechanism and duration. If bleeding occurs postpartum, he will instantly search for its source, will institute active and efficient treatment, and try to restrict the loss as much as possible. Finally, he will treat the resulting anæmia in a scientific manner, and in so doing he will fulfill his obligation to his patient and to her family. The grateful memory of a mother rescued from a bloody grave will linger long in the mind of the physician, and will form one of the brightest pages in his life's history.



PROFESSOR A. WATSON

DEPARTMENT

NICHOLAS SENN FESTSCHRIFT

HYDATID DISEASE IN AUSTRALIA

By Prof. A. WATSON, Melbourne, Australia

WITHIN the limits of space consigned to me, it is impossible to do justice to a subject that has become so overwhelmingly voluminous and complex as that of hydatid cysts, when they are considered from all their multitudinous bearings.

I purpose, therefore, in this article to deal principally with certain special manifestations of the disease which have come under my immediate observation, and on which some misconceptions are apt to prevail. I shall touch on questions of accepted doctrine only so far as may be necessary for my purpose.

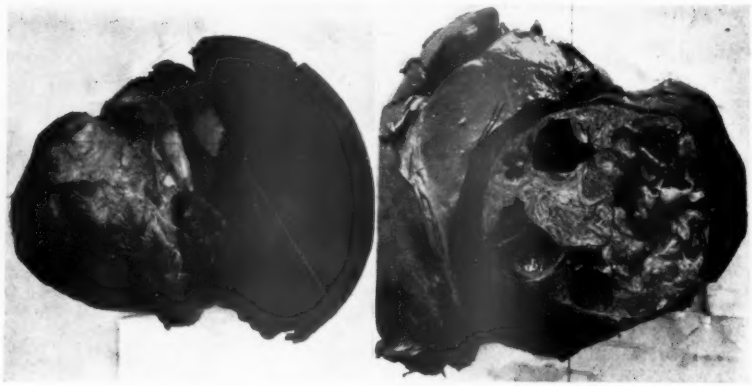
The several large tapeworms (t. marginata, t. cœnurus, t. cucumerina, t. serrata, etc.) infesting the dog, and continually shedding egg-bearing segments so large as easily to attract attention when passed under conditions of domesticity, are nevertheless innocent as factors in the ætiology of hydated disease in man.

The tenia echinococcus, so baneful in its effects on the human species, is so insignificant in point of size that an inexperienced observer usually mistakes it for a swollen villus of the dog's duodenum, which portion of the intestine the ingested echinococcus head, or scolex (not to be confounded with the echinococcus ovum), always selects as its abode, wherein to complete its sexual life as a tapeworm.

Its life history conforms to Steenstrup's law of the alternation of generations, whereby two generations of individuals, possessing different forms of organization, existing under different conditions of life, and reproducing in different ways, alternate with each other.

The tiny tapeworm, having utilized the dog as a primary host, succeeded by a larval or cystic phase which fulfills its destiny in the body of another animal (intermediate host), usually one of the domestic ungulates, but all too frequently in that of man himself.

The size, shape, and manner of reproduction of the cyst vary according to the species of animal which serves as the intermediate host, and also with the special characters of the surrounding tissues. In the viscera of youthful manhood and of the higher apes (11), the cyst attains its maximum size, that of a large watermelon; in the sheep this is restricted to that of a peanut; in the hog, ox, or camel it may attain that of a baseball. In the horse, although



A *B*

Fig. 1. *A*. Dry hydatid of liver from male aboriginal. Visceral surface. (Same specimen as in Fig. 18 of Festschrift.) *B*. Anterior surface of liver after removal of a slice to demonstrate drying hydatid and the collapsed mother-cyst which has assumed a central position. Same liver as *A*.

habitually depasturing with sheep, I have never succeeded in finding it, as apparently the viscera of that animal do not offer sufficiently favorable symbiotic conditions to the injested ovum to enable it to proceed to the cystic phase.

Rabbits, which already constitute a frightful pest in Australia and New Zealand, although serving for the production of echinococcus cysts in laboratory experiments, when running wild fortunately develop in preference the bladder worms of other tenia than the t. echinococcus (cysticercus pisiformis, c. serialis, etc.). Pastoralists, in fact, recognize the spread of bladder worms in rabbits as a means whereby their numbers are checked.

I have personally had no opportunities of examining goats, though Madden (1), in discussing the extreme rarity of hydatid disease in Egypt, states that goats do harbor echinococcus cysts.

One might naturally conclude that, as the life of the sheep is much shorter than that of man, the cyst in that animal is small because it has not had sufficient time to attain the larger dimensions of human echinococcus bladders. This is not, however, the explanation, for I have thrice, in children under four years of age, seen a cyst as large as the head of the child who harbored it. On the other hand, none of the multiple cysts found in the bodies of three discarded stud ewes of twelve years and upwards were larger than a filbert.

The health of the sheep does not appear to be affected by the presence of the parasite, presumably on account of its circumscription by a tough adventitia evoked in the connective tissue of the containing organ by the presence of

the growing cyst. This adventitia, moreover, has a marked tendency to calcification, and in any case acts as a check to the untrammelled spherical expansion of the parasite, forcing it, instead, to expand its vitiated energies first of all in the production of scolices, to the end that the species shall be maintained, and secondarily, in saccation of its capsule, in order to increase its range for the osmotic absorption so essential to its individual existence.

The opposite condition is exemplified in a case of central pulmonary hydatid represented in Fig. 17. Here the symbiotic conditions have been so favorable to its existence and growth that the cyst attained a capacity of three quarts, without ever having produced sufficient irritative hyperplasia of the surrounding lung parenchyma to cause it to become invested with the adventitious fibrous capsule, which we are too apt to associate invariably with an echinococcus cyst. The bladder which, if it had contained a brood, we would call a mother-cyst, had, under its specially favorable conditions, produced such a bulk of chitin that its collapsed walls were suggestive of an elephant's ear boiled into a semi-gelatinous condition. In other words, we have, in such a case, one of those instances of vegetative overgrowth produced at

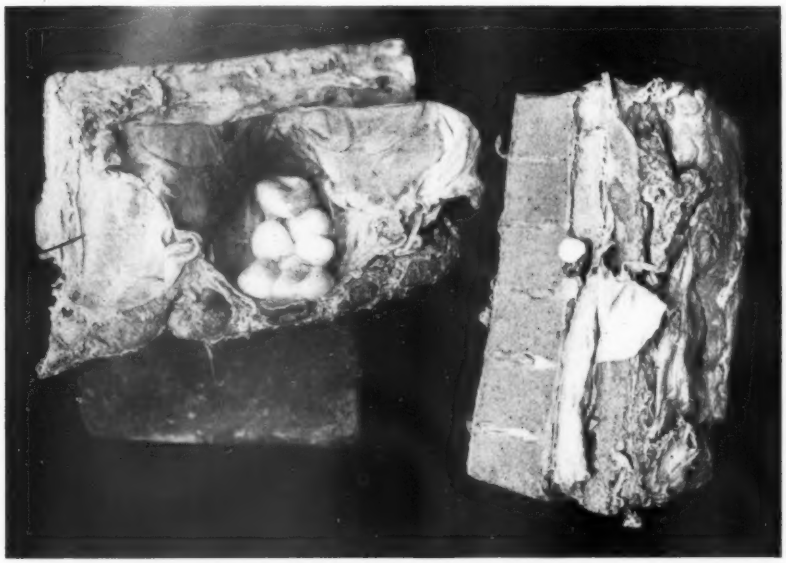


Fig. 2. Retropleural hydatid from a man aged 40 who was paraphlagic. The disease most probably commenced in cancellous bone and beaded off into spinal canal (extra thecal space) and forwards between two transverse processes into thorax where cysts assumed ordinary large size instead of the small vesicles usual in bone. This might have been mistaken for a pleural hydatid by a surgeon. The photograph shows anterior and mesial surfaces of left half of thorax.

A *B*

Fig. 3. *A*. Cyst which passed down ureter and urethra of a woman 11 days after removal of the left kidney. Twenty-four years previously the disease was cured (sic) by puncture. Woman for 23 years felt all right. *B*. Subcutaneous hydatid. Tough capsule containing daughter-vesicles but no mother-cyst. Removed from the left flank of a woman who said she had noticed it first 22–24 years before. It shows for what a long period the living parasite may remain quiescent. Case is mentioned in the Festschrift article. It was looked upon as a sebaceous cyst for 20 years.

the expense of the reproductive functions, that are so familiar to the horticulturist.

A few words may be said here concerning the ætiology and geographical distribution.

Posselt (2) draws attention to the fact that in all those countries where hydatid disease is endemic for man, we find sheep in large numbers relatively to other stock.

Stirling and Verco (3) remark that in addition to the numerical influence of sheep as agents for maintaining the supply of scolices or potential tapeworms, we must bear in mind that their tending and care involve the use and assistance of the dog, to a much greater extent than in the case of other intermediate hosts, such as the ox, pig, or camel.

Our text-books direct attention to the close intimacy which obtains in Iceland between its human inhabitants and their dogs, but ignore the more important factor of the connection of the latter animals with the sheep-raising industry in both this and other homes of hydatid disease.

Amongst our Australian aboriginals, whose mongrel swarms act as scavengers to the killing-yards of the pastoralist, hydatid disease reaches its high-water mark of prevalence, and is a prime factor in the impending extinction of that primitive race.

In Egypt, Professor Looss, after researches extending over three years, never once found the t. echinococcus in the stray dogs about Cairo, although he once found it in a small pet dog. In any case, as Madden remarks (1) "The

A *B*

Fig. 4. *A*. Isaac, aboriginal, aged 50 or 60 years. Visceral surface of liver. Adenoma of the liver. *B*. Operated upon October 19, 1904, when non-hydatid nature was revealed. The falciform ligament was sutured over the incision in liver with catgut. Patient died October 31, 1904. Case of mistaken diagnosis, for which there was every excuse. Adenoma of liver mistaken for hepatic cyst and omental cysts of echinococcal origin. Notice the bossy tongue of left lobe which suggested omental tumors. Notice where mass was incised, catgut stitches still holding falciform ligament down over the incision. Isaac came from a region where hydatid disease was as prevalent as in any part of Australia. His family (several members) had been treated for hydatid disease. Some of them had died of it.

pariah dog, even were he, as a scavenger of the village, to become infected, is so shy and wild that opportunities for close association with man are wanting."

In Natal, the hospital records contain no account of hydatid disease amongst the numerous Kaffirs who apply for relief, and the same statement holds good for the Transvaal. In the adjoining Cape Colony, and the Orange River Colony, sporadic cases occur; it may be because sheep-farming, although not on the Australian scale, exists. Possibly in the near future, when some of the 9,000 marino ewes recently acquired by the Boer delegates (1906) for stud purposes, have been devoured by the dogs and their congeners, the hyenas and foxes, hydatid disease may become more common in South Africa.

There are countless "chow" dogs in China and Japan, yet the first operation for hydatids in Japan was on a white man from Australia, and the only case my teacher, Dr. Cantlie, of the London School of Tropical Medicine, saw in 40,000 patients in China, was that of a recently arrived Frenchman.

It therefore appears that the dog *per se* is as harmless in the production of hydatid disease as was the anopheles of Mauritius in the production of malaria, before the advent of the Indian coolie (imported for Railway construction), with his plasmodia-laden blood, transformed that island of centenarians into a hotbed of fever.

Fig. 5. Echinococcus cyst in lung of an old bull camel. Natural size. One endogenously produced daughter-vesicle carrying scolices (its walls are thicker than those of the mother-cyst — white dots). Laccated cavity of capsule lined with chitinous layer, i. e., mother-cyst, closely adherent to inner surface of capsule like wall paper, and so thin as to be hardly recognizable. It mimics the inner surface of the capsule which is a production of the host. The cyst has evidently developed in a bronchiole, because cartilage forms part of the very thick capsule which also is in process of calcification. Although developed within a bronchiole no communication exists with outer world. Parasite is closed in all around. Perhaps if the chitinous mother-cyst were torn off the inner surface of capsule small air tubes might be found to open on surface of inner wall.

Fig. 6. Hydatid cyst which simulated goitre. Removed by Dr. MacCormick, of Sidney, from a woman of 31.

I have it on the authority of my friend, Mr. McCullough, of the Melbourne Cold Storage Depot, who spent a year in Argentina, that echinococcus cysts (9) only became familiar objects of surgical attack *pari passu* with the ever expanding sheep-raising industry of that country, where already horses and cattle had roamed the pampas for centuries.

The distinguished surgeon to whom this work is dedicated, informed me on his recent visit to Australia, that in his wards in Chicago, hydatid cysts were absent. I take it therefore that the thousands of hogs which are slaughtered every day in that city are not important factors in the ætiology of hydatid disease, any more than are the oxen, camels, and horses of Asia, Africa, and I may add the northern portions of Australia, where for climatic reasons horses and cattle almost entirely take the place of sheep, which flourish so wonderfully in the more temperate portions of our island continent.

An observant sheep-farmer of the southeastern district of South Australia, who has himself been operated upon four times for abdominal hydatids, attributes the increasing frequency of the disease in his district to the marvelous multiplication of European foxes and rabbits, innocently introduced by his predecessors for sporting purposes.

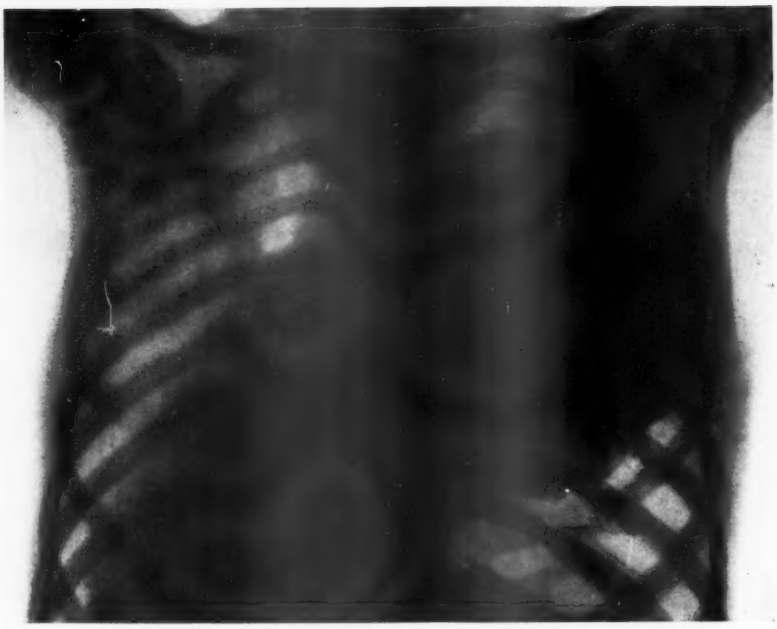


Fig. 7. Hydatid cyst, right lung (woman). Operated upon by Dr. Cole, 1905.

So far as I can discover, the more dangerous form of parasite, known as echinococcus multilocularis vel alveolaris, has never existed in Australia, either in man or beast. The distribution of this disease is peculiar, being, as those familiar with it tell us, almost exclusively restricted to two principal regions, one comprising South Germany, Switzerland, and the Austrian Alpine region, and the other southeastern Russia and western Siberia. Posselt (2) explains this distribution by reference to the fact that, of the domestic animals affected with this form, it is the great cattle which almost exclusively suffer, while sheep very rarely do so. In the districts in question, it is the former which form the principal industry.

I quite agree, therefore, with what has been urged by Stirling and Verco (3), that in view of the many striking differences — pathological, zoölogical, and clinical — which exist between the ordinary hydatidose and the alveolar forms of echinococcus cyst, it is unfortunate that the term multilocular has become, by long use, identified with the alveolar variety. This is not cystic in the same sense as we use the term in the hydatidose variety, although, in advanced cases, septic disintegration, of the more centrally situated and

Fig. 8. Hydatid left lung (man). Operated upon by Dr. F. Bird, Melbourne, Australia.

devitalized portions may result in the formation of a cavity of such a kind as occurs in a phthisical vomica. Nor is the contained fluid the limpid, saline solution of the hydatid cyst with which we are so familiar, but a repulsive seropurulent emulsion of calcareous particles, cholesterin, bilirubin, and other detritus; hence the name of ulcerative multilocular echinococcus tumor, applied to it by Virchow, when, in 1856, he eliminated it from the list of cancers by discovering its helminthic origin. Fifty years later, the causative helminth was found to be very similar to, but not identical with, the t. echinococcus of V. Siebert, met with in Australian dogs.

PSEUDO-MULTILOCULAR HYDATIDS

There are several productions of the common echinococcus cyst which are multilocular in the literal sense of the word, and yet have nothing in common with the alveolar form except that they are many-chambered. They do not infiltrate the surrounding tissues like a cancer — which the true alveolar form does, nor are their loculi restricted to the minute dimensions of the latter form, in which they are never more than 1 to 5 mm. in diameter.

Where such a multilocular disposition exists in hydatids of the common or

hydatidose form, the interlocular septa usually consist of connective tissue; in others, however, they are formed by the blended chitinous walls of contiguous daughter-vesicles (vide Fig. 1, *A*). In either case I do not hesitate to term them pseudo-alveolar or pseudo-multilocular. Of these pseudo-alveolar forms, that which most clearly approaches the true alveolar echinococcus tumor in its behavior, is one in which the bladder worm reproduces itself exogenously in the cancellous tissue of bone. Resembling the alveolar hydatid to a less degree is the pouching variety, which develops in omental cysts, or in the residual scar tissue of a previous operation in man, possibly as the result of the implantation of scolices; or it may occur also in the viscera of sheep or camels, in which animals the tissues react to the presence of an imported ovum of the common kind by an exceptionally early sclerosis of the adventitious capsule, and consequent reduction of the nutritive supply.

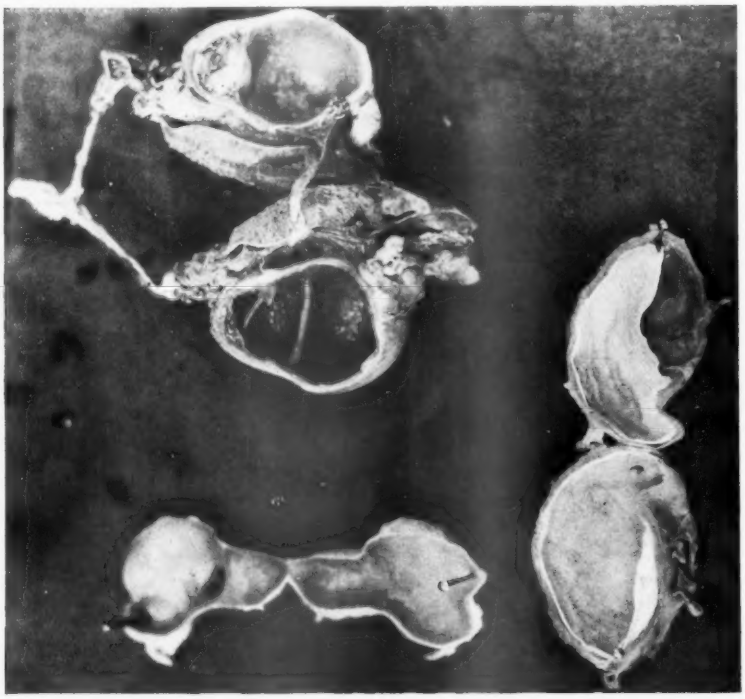
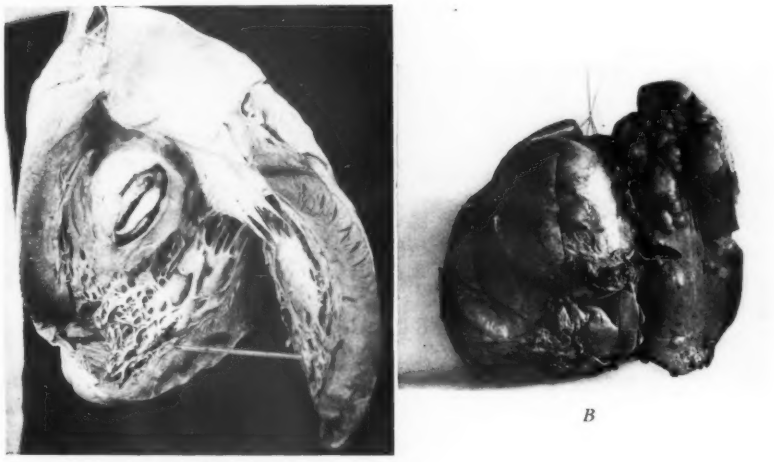


Fig. 9. Pouching hydatids of human omentum (man, 27). Of much younger age than the dry hydatids of omentum seen in Fig. 4, which accompanied the paper for the Festschrift. This form is common in sheep which are not more than four years old.



A *B*

Fig. 10. *A*. Hydatid cyst in interventricular septum. *B*. Adenoma of the liver of an Australian aboriginal (Isaac, aged 60), which was operated upon as an echinoccocus cyst by mistake. Patient came from infested district. Subjective and objective signs correspond to hydatid.

In this form, all stages of loculation, from simple sacculation to complete severance, may occur, such, for instance, as the extrusion of a nude vesicle into a serous cavity. Exogenous buds are, indeed, sometimes produced from a human omental cyst with such exuberance that the mother-cyst becomes invaginated by their pressure. Thus the latter appears to be packed internally with vesicles which are really of exogenous growth. When such a condition occurs, there results a bewildering disposition of the chitinous contents of the cyst, which might easily lead to a mistaken inference as to their mode of growth. Fig. 20, *A*.)

Of late years, partly as an aftermath of the pernicious treatment by aspiration, we meet with cases of palingenesis of the parasite so long after its supposed death, that the adventitious capsule has undergone more or less complete calcification from old age. The contents of such a cyst include discoid agglomerations of sage-like vesicles, highly suggestive of the chitinous-plugs found in an alveolar echinococcus. I shall again refer to such conditions in connection with what I have elsewhere termed the stage of "sluggish life" in the parasite, in relation to the so-called burrowing hydatids and to other multitudinous cystic developments.

Another type which is multilocular, but in which the loculi are hundreds of times larger than in the true alveolar form, is seen in pelvic hydatids in either sex, where the capsules of multiple cysts coalesce and their cavities inter-

A *B*

Fig. 11. *A*. Omental hydatid from woman aged 41. A dermoid cyst occupies the outer surface of the capsule. This is the only dermoid I have seen in the omentum in 22 years. *B*. Hypertrophy of left lobe of liver due to hydatid (removed) of right lobe which has practically all been used up by the parasite. Returned Contingenter 29.

communicate as the result of mutual pressure. I have frequently seen hydatids of this kind mistaken in the female for uterine fibromata, or ovarian or broad ligament tumors.

In several of these cases, after evacuation, supposed to be complete, there occurred subsequently repeated discharges of vesicles not dislodged at the time of operation. Such instances as those last mentioned afford examples of multiple (Fig. 20, *A*.) rather than multilocular hydatids, though the two terms were often confused with one another by the older writers and they invite further consideration.

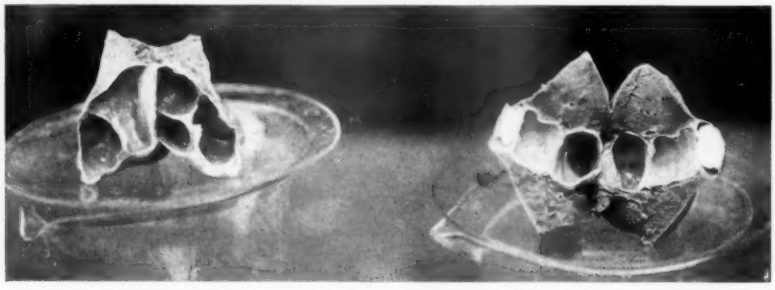


Fig. 12. Sheep's hydatids.

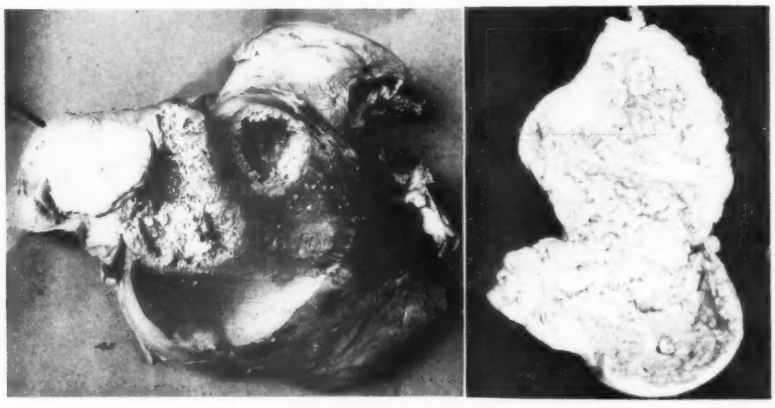
MULTIPLE HYDATIDS

To account for the presence of a number of echinococcus cysts in the same individual, or even in the same viscus, it is necessary to suppose either that there has been simultaneous or successive invasions of embryos by the usual routes, or that there has been collective implantation of the contents of a primary cyst elsewhere. (Fig. 20.)

So far as the former of these explanations is concerned, it is difficult to understand how the multitudinous cystic developments so often found within the abdominal cavity, in the fascial planes of the body, or in the medullary cavity of bones, can be the result of an arterial shower of embryos which had traversed the portal and the pulmonary circulations, without dropping a single straggler on the road to form a cyst in the liver or the lung.

We must bear in mind that tenian ova are taken into the body of the intermediate host in all stages of freshness and in all varieties of number. The man who drinks water lately contaminated by a large number of recently discharged eggs, possibly those of an entire terminal segment, runs a greater risk of developing a numerous brood of cysts in his inside, than a man who consumes an equal number of old ova which have been weakened by exposure.

Leuckart gives the diameter of an echinococcus embryo as ranging from 0.022 mm. to 0.028 mm., and that of a pulmonary capillary as from .0056 to .0113 mm., according to which estimation, in the absence of a patent foramen ovale, the travelling embryos would encounter difficulties in reaching the sys-



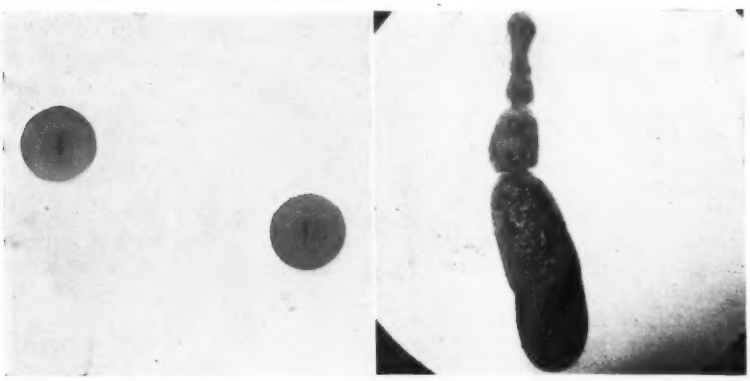
A *B*

Fig. 13. *A*. Liver abscess mistaken for suppurating hydatid in an old (white) man who came from hydatid stricken region. *B*. Omental capsule from which a parasite has escaped. Opened up to show the choronic looking mass.

Fig. 14. Hydatid of humerus from woman. 30 years duration. Amputation by Dr. Bird, 1905. Vesicles beginning to invade (a) glenoid fossa above, and (b) olecranon below. To demonstrate the fact that the vesicles, if a bone hydatid, can finally traverse the joint.

tematic circulation, and even if they succeeded, one would still be at a loss to understand how they were all guided by the aortic stream into the area of distribution, it may be of a single artery.

Nevertheless, we cannot deny that arteries, veins, and lymphatics may all participate in the transportation of embryos to their place of future develop-



A *B*

Fig. 15. *A*. Tænia echinococcus; natural size. Veterinary surgeon, Desmond, photo. *B*. Veterinary surgeon, Desmond, photo, 1906.

ment. Probably, also, the embryo of tatenia echinococcus exerts a certain selective power as to its destination, in a manner conformable to that possessed by the embryos of the t. cœnurus (one of its companions in the dog's intestine) in finding its way to the sheep's brain rather than into the portal circulation.

Another factor which we cannot overlook, is the known permeability of living tissues to animal parasites, easy of comprehension by anyone who has seen an unencysted trichina disporting itself in the muscle of a recently infested guinea pig. An echinococcus embryo, once liberated from the eggshell, is a protoplasmic and elastic creature, which, we may readily conceive, is capable of actively threading its way along perivascular planes, rather than of being passively carried by the current of a blood- or lymphatic-vessel. Such an hypothesis would accord fairly well with relations which hydatid cysts of the neck bear to the blood-vessels. I have twice seen hydatid cysts treated as aneurisms of the subclavian artery. Allen, and also Moore, of Melbourne, have published similar observations.

In the genesis of omental hydatids we can easily conceive that embryos capable of boring their way into the peritoneal cavity, would be impounded as intruders by the omentum in the exercise of its usual function of defensive mobility.

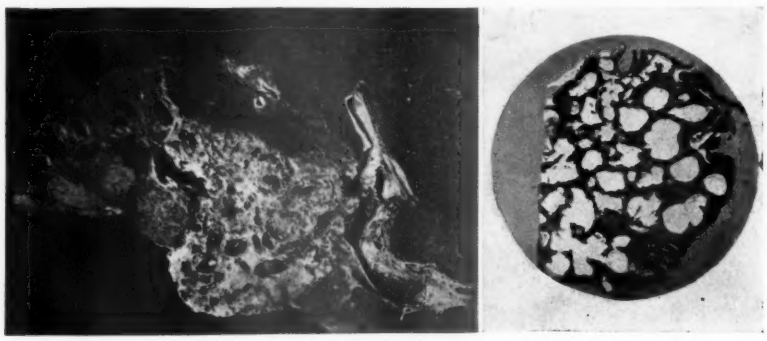
As lymphatics have been shown to arise from, and not empty into, the peritoneum, an embryo, to reach its destination by the lymphatics, would have to move, as it were, upstream, unless it was passively carried into the receptaculum chyli, up the thoracic duct into the great systemic veins, and down again to a resting-place in the subserosa of the peritoneum. Here,

during its development into a cyst, it would receive a peritoneal investment, and finally, as a pedunculated cyst, occupy the abdominal cavity exactly as if it had bored its way thither at the outset, and had acquired its capsule by exudative process of the peritoneum, like an escaped fertilized ectopic ovum of a mammal. In view of the peritoneal cysts and velamentous adhesions met with in abdominal surgery, this view is at least not improbable.

In reference to multiple cystic development not due to the presence of embryos, blood-borne or otherwise, but to the escaped contents of a primary cyst elsewhere, there is accumulated clinical and experimental evidence that not only may escaped daughter-cysts continue growing in a suitable nidus, but that scolices, singly[1] or in brood capsules, may develop into cysts. This phenomenon of implantation occurs as the result of one of two modes of escape of the contents from the parent cyst.

(In the true alveolar form of echinococcus tumor, Melnikow-Raswedenkow holds that the cystic phase of the parasite is capable of producing a secondary crop of amœboid embryos, without having recourse to the egg-bearing segment of the parent worm for a supply of potential cysts, hence, according to this writer, metastasis to other organs is so much to be apprehended in that really malignant parasitic growth.)

In the more common mode of escape, simultaneous rupture of both mother-cyst and the adventitious capsule occurs, whereby the contained endogenously developed daughter-vesicles and scolices are discharged into the peritoneal



A *B*

Fig. 16. *A*. Multilocular (alveolar) echinococcus. To show difference between it and the pseudo-multilocular forms as network in sheep, etc. *B*. Alveolar echinococcus brought from Germany by A. Watson. Magnified 3 times.

[1] An example of the development of an echinococcus cyst from an implanted scolex, is afforded by a case under Dr. J. A. G. Hamilton, of Adelaide, who, while exploring the chest of a supposed consumptive with a Dienlofoy's needle, in 1879, caused the rupture and expulsion of a pulmonary hydatid. Twenty-five years later, Dr. Hamilton removed a subcutaneous hydatid, the size of a walnut, from the site of the former puncture.

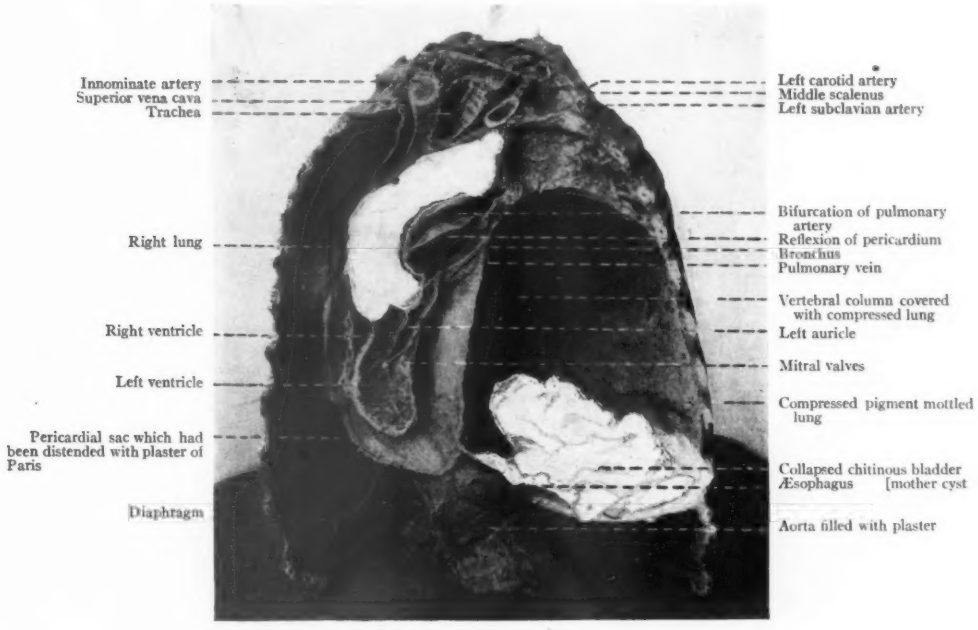


Fig. 17.

cavity, there to receive their capsule in virtue of the plastic power of that membrane.

On one occasion, I saw more than a dozen vesicles enclosed in a common capsule of thin, but tough, texture, which lay across the abdomen like a half-filled water-bag. It was overlooked during an operation for the evacuation of two ordinary tense cysts of the liver. At the necropsy, a few days later, I found an old, puckered scar which had doubtless resulted from rupture of a parent-cyst, and thus afforded an explanation of the presence of the large cluster of motherless daughter-vesicles just mentioned.

The second method of escape is not by rupture of the sac, but by a gradual process of perforation of the capsule, in one spot, by exogenously developing daughter-vesicles, an event to be explained as follows: When from trauma or other cause, a mother-cyst bursts without a corresponding rupture of the capsule, the latter gradually shrinks, and finally comes to enclose only the gelatinous remains of the parent-cyst and its contained brood, together with a variable quantity of smegma-like débris, rich in cholesterin crystals and calcareous particles. Some of the daughter-cysts are, however, not dead.

A *B*

Fig. 18. *A*. Superior or diaphragmatic surface of liver. Hydatid of right lobe of liver. It is becoming dried up. The mother-cyst is folded up in a central position. Some of the daughter-cysts have retained their fluid but will lose it eventually and lead a sluggish life in a state of suspended animation perhaps for several years when suddenly either the patient is found to be suffering again from hydatids (burrowing type), or suppuration takes place and brings matters to a crisis. Liver abscess? *B*. Visceral surface of the same liver as in male aboriginal, aged 53. McKinlay alias Wannemuncho. This is merely for comparison with Fig. 17. It is the same liver from the other (visceral) surface, and shows the compensatory hypertrophy of the left lobe (usual in such cases) much better. It shows the right suprarenal capsule, the vena cava, portal vein, ductus choledochus, gall-bladder and cystic duct, hepatic artery, impressio renalis, and a point at X where the capsule is very thin over the area of about 1 cm., and where the parasite would eventually perforate by means of an exogenously produced daughter-vesicle and pullulate along the lumbar fossa into scarpas triangle, where it would be mistaken for a sarcoma. In some cases the migration is upwards into the thorax through a round hole worn in the diaphragm, over which area the lung always has time to become adherent. The medical adviser would probably think he was dealing with a primary pulmonary hydatid and not one of hepatic origin.

(Fig. 18.) They are in a state of suspended animation, or, as it has been previously termed, in a condition of sluggish life. Sooner or later, in the absence of pyogenic infection, which is of a very frequent occurrence, an exogenous vesicle pushes its way, insidiously, through the adventitious capsule; others follow and pullulate, or "bead off," into the surrounding planes.

This is well seen in the case of thoracic invasion from the liver, when the patient, without exhibiting the alarming symptoms of a ruptured pulmonary hydatid, suddenly coughs up vesicles of hepatic origin. (It is very rare for a primary hydatid of the lung to produce daughter-vesicles. Fig. 17.) As an example of such a case of hepatic origin, I know of a man who, while kangaroo hunting on a rough horse, suddenly halted, coughed up several vesicles and rode six miles to his home afterwards. Had that been rupture of a primary pulmonary hydatid, he would have run a great risk of suffocation by flooding or by impaction in his larynx of a piece of cyst; while the man whose lung has been invaded from the liver, though he escaped these immediate dangers, has great and protracted risks yet to supervene.

Fig. 19. Two contiguous capsules, one suppurative, the other healthy and containing two daughter-vesicles (exogenous), remain in the photo. Nutmeg liver from pressure on veins. There is no left lobe. It is represented by old scar tissue. *A*. Suppurating capsule. *B*. Mother-cyst.

The burrowing type is also well illustrated by retro-peritoneal hydatids, when an unsuspected polycystic development in the lumbar fossa finally appears in Scarpa's triangle, where it is apt to be diagnosed as a sarcoma.

Sometimes an exogenously-produced bladder makes its way through the tough capsule of an omental cyst. What becomes of vesicles which make their emergence in such an insidious manner? Either they are again taken care of by the omentum or they gravitate into the free peritoneal cavity, and may possibly account for the presence there, in very rare instances, of one or more naked and free cysts, these being entirely unaccompanied by the peritoneal reaction, which would certainly have been produced by the presence of the contents of a suddenly ruptured mother-cyst and its capsule. In contrast with this insidious mode of exit, is a case observed by Dr. MacCormick, of Sydney, in which he was called during the night to operate without delay upon a youth who that day, while bathing, had been taken suddenly ill with what was apparently an acute attack of appendicitis. On making the incision associated with the name of Dr. McBurney, naked daughter-cysts were discovered within the inflamed peritoneal cavity. A subsequent median incision disclosed a ruptured hepatic hydatid cyst. The patient's life was saved.

I have occasionally noticed the capsule of an omental hydatid, from which

the former parasitic occupants have escaped, gradually filled with the products of connective tissue proliferation. Once or twice, in old people, I found calcareous nodules, which I regarded at the time as calcified lymph-glands, but which I now think were of parasitic origin, notwithstanding the absence of parasitic remains.

In the intermuscular planes of very mobile and greatly used parts, the gradual "beading off" of vesicles by exogenous budding, permits of the formation of a very fine capsule, which may be of such tenuity and transparency that its blood-vessels may lead to the belief in a blood-vascular system of the bladder-worm itself.

On the other hand, the capsule of an echinococcus growth, which has developed in subcutaneous fat, quickly acquires the toughness of leather, and appears to possess a greater power of resistance to the egress of the parasite than when the latter occupies an internal viscus.

A case in point is that of a lady on whom, in 1886, an ovariotomy was performed. Previous to the operation, she requested the surgeon to remove a painless hard swelling, the size and shape of a gherkin, which had been present for 12 years in her left flank. In the anxiety connected with the major operation, he overlooked the smaller matter, but 11 years later (1897), while performing a radical cure of a hernia which had developed in the laparotomy scar, he remembered the tumor in the flank, and removed it, in the belief that it was a semicalcified sebaceous cyst. On section, its parasitic nature revealed itself in the form of a tough sacculated fibrous capsule, stuffed with living exogenously developed daughter-vesicles, in the multiplicity of which the identity of a parent-cyst (if one still existed) was impossible.

Thus during 22 years the parasite, although alive, had made no apparent progress in the matter of extension.[1]

The specimen shown in Fig. 17, was obtained from the cadaver of a shepherd, between 50 and 60 years of age, who, for several years, had been subject to a cough, and who finally succumbed to cardiac embarrassment, caused by the ever-expanding parasite.

The alternate (right) lung was unadherent and everywhere crepitant. The liver and remaining viscera were quite free from parasitic invasion.

The original embryo probably arrived as an air-borne egg (6) in the center of the lung, where it hatched out and developed into an immense cyst, with very thick chitinous walls. No daughter-cysts were present. The adventitia of the parasite is represented, not by the usual fibrous capsule, but by compressed pigment, mottled lung tissue, everywhere fused with the costal and mediastinal pleuræ.

A flattened air tube, of the diameter of a wheat straw, opens into the cavity, and must have placed the ectocyst of the parasite in contact with atmos-

[1] However convenient it may be to term the capsule, ectocyst, it is none the less zoölogically incorrect. Otherwise the compressed lung-tissue depicted on Fig. 17, would have to be called ectocyst, and the lamellated chitinous membrane of the bladder-worm, the endocyst. Zoölogically speaking, the lamellated chitinous membrane is the ectocyst, of which the lining membrane of finely granular protoplasma (Keimmembran) is the endocyst.

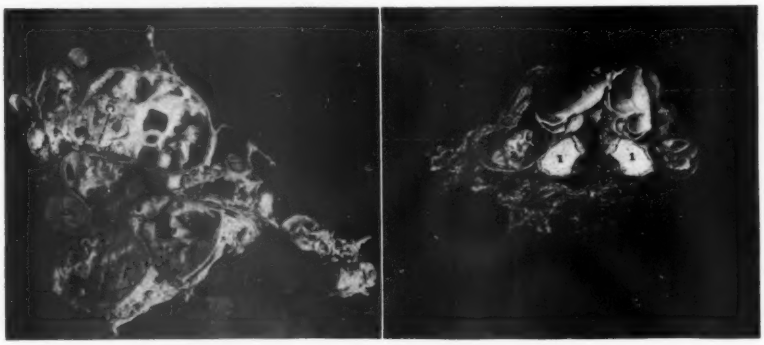
pheric air. The absence of any overgrowth of connective tissue is strongly suggestive of symbiotic relations between the parasite and its host (5) and (7).

Concerning the specimen shown in Fig. 18 the following may be said:

A slice has been removed from the right lobe, in order to demonstrate the presence of an echinococcus cyst which is in process of losing its fluid, and becoming what is sometimes termed a "dry hydatid." This at any moment may become septic, and matters be brought to a crisis; or it may persist in an aseptic condition and eventuate in a "burrowing hydatid," in the right lumbar pouch, as in this case the perforation would occur behind, close to the impressio renalis, at a point not shown in the Plate. The mother-cyst, but not the capsule, has ruptured, and the contained fluid has dried up and caused the daughter-cysts to become stranded around the folded-up mother-cyst.

This condition represents the former so-called cure of the advocates of the aspiration treatment.

Many of the daughter-cysts are not dead, several sterile ones have even retained their fluid. Others of minute size, resembling grains of sago, and each containing several scolices, are present in a state of suspended animation, a condition which is not without parallel in zoöbiology; for instance, encysted trichinæ become active after 14 years of quiescence, when fed to a young guinea-pig (8).



A *B*

Fig. 20. *A*. Besides the multiplicity it shows examples of dry (living) cysts of great age. Also examples of pseudo-multilocular, type A. Also one dead and entirely obsolete cyst in its capsule, B. On the right side C, is a dry cyst where the photograph shows actual oxogenous budding commencing. *B*. Omental hydatid (one half size). It shows four different conditions of bladder form.

1. Obsolete. Very old cyst (20 years).
2. Group of exogenously developed vesicles. Middle-aged cyst (10 years).
3. Pouching youthful cyst. (1 year.)
4. Old cysts which have died in infancy embedded in omentum.

The specimen shown in Fig. 19 was obtained from a patient who died, exhausted after a series of operations for multiple abdominal hydatids.

The left lobe of the liver once harbored a growing mother-cyst, which, with its capsule, burst and discharged its contents into the peritoneal cavity without, however, evoking a fatal peritonitis. The left lobe is represented by a mass of fibrous tissue, in which are embedded several small scolex-bearing pouching cysts, surrounded by thick tough capsules.

The right lobe of the liver has undergone a compensatory hypertrophy. It also shows a nutmeg mottling, resulting from backward pressure by a cyst which occupied the coronary ligament, and pressed on the heart.

One special feature revealed by the section is the presence of twin-capsules, one of which is suppurating (purulent capsulitis, with disintegration of its parasitic contents), while the other is quite healthy and shows a smooth, shining inner surface like that of a healthy serous membrane.

A pair of pellucid exogenously-produced daughter-vesicles occupy a depression in its wall.

The mother-cyst came away with the anterior slice (a photo of which is forwarded for comparison).

The capsule of a growing hydatid is like a serous membrane, sometimes the seat of a mild inflammation which does not necessarily go on to suppuration.

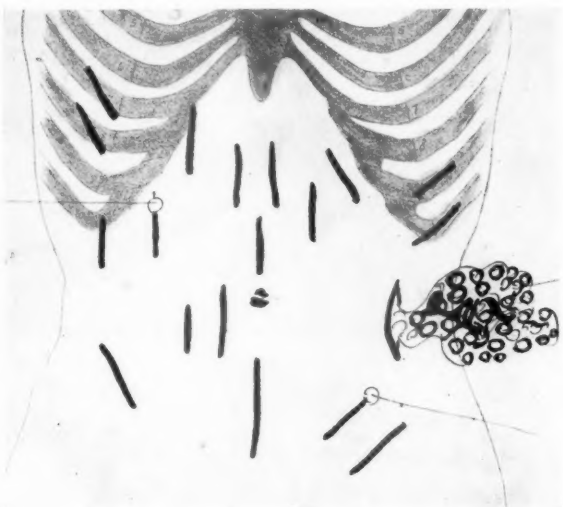


Fig. 21. Diagram of abdominal wall of a man of 37, who was operated upon 16 times, with nineteen incisions in nine years, and eventually cured (at least for several years if not for good).

Fig. 20, *A*. Slice from an omental hydatidoma which was removed, together with many isolated mono-cysts (not shown in photo), from a farmer, age 44, who first sought advice, in 1886, for a movable abdominal tumor, but who only submitted himself to operation November, 1906.

It is impossible that this multitudinous cystic development is due to repeated invasions by accidentally injested ova, because his wife and numerous family, existing under the same conditions of life, have entirely escaped infection.

It is also improbable that the plurality of the cysts is due to implantation of the escaped contents of a primary cyst in the liver, which had ruptured, because the recent abdominal section failed to reveal any traces of such.

I believe, therefore, that the multiplicity is due to an emigration of daughter-vesicles, or perhaps scolices, through the adventitious capsule into the enveloping omentum, such daughter-vesicles and scolices being the asexually-produced descendants of the original embryo, which obtained a footing in the omentum a quarter of a century previously. The prognosis is dubious, because at least a dozen operations will be necessary to rid him of the parasite.

Fig. 20, *B*. Diagram of the abdominal wall of a man, age 37 (now 41), who had been operated upon for multiple peritoneal hydatids 16 times, with 19 incisions, in 9 years. At the last operation, which, apparently, completed the cure, I had the privilege of being present and witnessing the evacuation of a dry hydatid (such as is depicted in Fig. 20, *A*.) and a couple of small implantation vesicles developed in the scars of previous incisions. The patient has since remained well, which happy result is as much a tribute to his own heroic fortitude and faith, as to the skill and perseverance of his surgeon, Col. Chas. Ryan, of Melbourne.

REFERENCES

1. Madden. Rarity of Hydatid Disease in Egypt: — Intercol. Med. J. of Australasia, March, 1904.
2. Posselt. (*a*) Die geographische Verbreitung des Blasenivurmleideus, 1900.
3. Allbutt. System of Medicine, 2nd Edition.
4. Melnikow-Raswedinkow. N. Studien über den Echinococcus alveolaris sive multilocularis, 1901.
5. Posselt. (*b*) Die Stellung des Alveolarechinokokkus, München med. Wchnschr., No. xii., 1906.
6. Dougan Bird. Hydatids of the Lung. Melbourne, 1877.
7. Lendon, A. A. Lectures on Hydatid Disease of the Lung. Baillere Tyndall, and Cox, London, 1902.
8. Johnson, E. A. Trichina spiralis. Australn. Med. Gaz., March 20, 1902.
9. Vegas J. Cranwell. Los Quistes hidatidicos en la Republica Argentina. (Rev. in Zentralbl. f. d. ges. Med. Chir., 1904.) Buenos Aires, 1900.
10. Moore, W. Intercol. Med. J. of Australasia, Sept., 1897.
11. Allen, H. B. Pathological Catalogue Melb. University Museum.
12. Barnet, L. E. Some observations on Hydatid disease. Austra. Med. Gaz., vol. xii.

TRANSACTIONS OF SOCIETIES

TRANSACTIONS OF THE CHICAGO SURGICAL SOCIETY

Stated meeting, March 1, 1907, with the President, Dr. D. W. Graham, in the chair.

DR. E. J. BROUGHAM reported A CASE OF RESECTION OF ELEVEN AND ONE-HALF FEET OF THE SMALL INTESTINE.

The case presented to-night is interesting because he has been deprived of his jejunum, a functionally important part of his small intestine. The patient is an Italian, 27 years of age, a railroad laborer by occupation. He has always enjoyed good health previously, with the exception of an attack of appendicitis, which he suffered two years ago and was operated on for in New York. There is a scar in the median line of the lower abdomen as evidence of a previous laparotomy.

His present illness began the morning of December 25, 1906; he had just arisen from bed, and while in the act of drawing his shirt over his head, was seized with severe pain in the epigastrium. He was nauseated and vomited. The pain and vomiting spells continuing, on the 26th a physician was called in, who prescribed for him, advising him to go to a hospital.

He was admitted to the Passavant Memorial Hospital on the 27th, at 11 o'clock A.M. The examination of the patient found the abdominal walls very rigid, percussion note tympanitic, everywhere excepting in the flanks and just above the pubis. Distention confined mostly to the median portion of the abdomen, above and below the umbilicus. No peristalsis was visible; there had been no bowel movement since the 24th, and no passage of gas for the same length of time. Temperature was 100°; pulse 114°.

The diagnosis of acute intestinal obstruction was made, probably caused by adhesions from the former laparotomy. He was prepared, and I operated at 2 P.M., 56 hours from onset of the attack. Doctors Hooper, Winer, Ruttunberg, and Hall were present; the internes, Doctors Hawkinson and Palm, assisting.

As soon as the peritoneal cavity was opened a large quantity of serous fluid escaped. The presenting coils of intestine were distended and gangrenous, black in color.

I enlarged the incision to inspect better the abdominal contents, and all seemed to be in the same condition of gangrene. The upper limit of the gangrene was found to have involved the jejunum within 2 inches of its commencement. The line of demarcation was distinct. There was also present here a loop of distended bowel, pressing against the left side of the mesentery of the jejunum. This loop was gangrenous, having been strangulated by a firm band. This band was evidently a stretched adhesion caused by the previous laparotomy. This was the only condition found which might have caused the thrombosis in the mesenteric veins. The resection was made at the commencement of the jejunum and continued until well in normal bowel below. Its total length when measured was 11½ feet.

The mesentery was thickened, dark mahogany in color, and infiltrated with blood; I resected it also. The veins were thrombosed; the arteries were active, spurting freely. The intestinal tract was widely dilated throughout, the resected portion filled with a bloody fluid; the serous coat of the remaining intestine was highly injected, and covered here and there with exudate.

An end-to-end anastomosis was made with a Murphy button, reinforced with a continuous catgut suture. The peritoneal cavity was flushed well with warm saline solution, and a cigarette drain placed in the lower angle of wound, leading to bottom of pelvis.

The patient's condition was desperate and several times he seemed to be on the verge of *exitus*, but rallied with the free use of strychnin, adrenalin, and camphorated oil, leaving the table with a pulse of 130°.

His convalescence was uninterrupted. He was fed entirely by rectum for the first week, allowing small amounts of water by mouth only. He passed the button on the sixteenth day. When he was discharged from the hospital January 28, 1907, 32 days after his operation, he weighed 123½ pounds; his weight before illness was 170 pounds. He returned in a week to be weighed; his weight then was 138 pounds; to-day he weighs 133½ pounds.

His stools average 6 in the 24 hours; they are unformed, semi-fluid, light mustard in color, and alkaline in reaction. They show no free starch but considerable free fat. The patient is on a mixed diet but does not seem to assimilate enough, as he

is always hungry; he is not growing in strength nor gaining in weight. Two weeks ago he returned to the hospital, on my recommendation, where I could observe him on account of rectal tenesmus and pain more closely; he also said his stools were streaked with blood. On examination I found he had annal fissures which have since disappeared under treatment. At the present time the patient feels perfectly well.

DISCUSSION

DR. M. L. HARRIS: This case is of unusual interest from the fact that the part of the intestine removed was the upper part, and it is one of the longest pieces of intestine which has been removed successfully. It does not seem to make so much difference as to the amount that is removed as it does the amount which remains. It is evident that the amount which can be removed depends very largely upon the amount of intestine which the patient originally had. We know that the length of the intestine varies greatly in different individuals. From five hundred to six hundred centimeters is the average length of the intestine, but it may reach a length of seven hundred or eight hundred centimeters. A man with a length of seven hundred or eight hundred centimeters of intestine can lose three hundred centimeters without much inconvenience, as more than enough would be left to nourish successfully the individual. An individual must have, so far as we are able at present to tell from what has already been done in this line of work, at least two hundred and fifty centimeters of small intestine, in order to digest and absorb sufficient food to maintain life. The important point, therefore, in considering the removal of the small intestine, is not how much we can remove, but how much is left.

DR. D. N. EISENDRATH: I have been much interested in the pathology of the case as well as in the operative portion of it. So far as the operation is concerned, the result is a remarkable one, considering the extent of the gangrene, and the large mortality attending cases of gangrene of the small intestine, following embolism and thrombosis of the mesenteric vessels.

In discussing the pathology with him, the first question I asked was with reference to the condition of the vessels, and the age of the patient. The age of this patient would, in all probability, exclude gangrene following embolism of the mesenteric vessels, so that the only possible cause of the gangrene in this case must have been a band which, in all probability, constricted the superior mesenteric artery. I would like to have Dr. Brougham tell us whether or not he believes in that theory. It seems to me that would explain the gangrene of such a large area just as much as either thrombosis or embolism.

DR. BROUGHAM (closing the discussion): With reference to the ætiology, I believe it was a thrombosis of the mesenteric vein, and that the gangrene was not caused by pressure on the mesenteric artery. I also believe that the thrombosis had its origin in the gangrenous loop, extending by infection from this area. This strangulated loop was high up, time was precious, and the patient's condition did not permit delay in identifying it; I thought at the time it was a loop of jejunum. Thrombosis of the mesenteric vessels is a very fatal condition. Doctors Jackson, Porter, and Quinby (*Journal American Medical Association*, 1904) have collected 214 reported cases with only 4 recoveries; 47 cases were operated on. The ætiology in this case to-night is extremely interesting.

RENAL RESECTION FOR PYONEPHROSIS

DR. WILLIAM E. MORGAN: I want to report this case because of its rarity, and the procedure adopted may be of avail to some of you in the future, if you should meet with a similar one. It is now long enough since the operation to know that it is a success. At first, I had grave doubts as to the outcome of the operation, but I am in communication with the patient occasionally, and know that she is well.

Mrs. O., aged 23, married for six months before coming under my observation, entered Mercy Hospital February 26, 1903. She gave the following history: Patient was never robust, yet in fairly good health until five years before she came to the hospital. Then she began to have sudden attacks of severe pain in the small of the back, on the left side. She called these "stitches." She had headache and *malaise* with these attacks, and they came on every three or four months, lasting from two to three days each time. There was no nausea or vomiting. The attack was brought on usually by exposure to cold or wet feet. If one occurred during the menstrual period it was much worse than at other times. Four months before she came under my observation, and two months after marriage, she had severe leucorrhea, which lasted for a month, but which stopped after using douches. She was never constipated; and there were no bladder symptoms. She passed a fair quality of water and without pain or distress.

Now as to the trouble which she had when she was admitted to the hospital: For three weeks she had *malaise* and some pain in the back on the right side, and one week before admission the pain in the

back and right lumbar region became suddenly severe, attended with intense headache, high temperature, but normal pulse. There were no bladder symptoms. On examination, the abdomen was found to be normal, excepting that it was tender, and high up on the right side was a mass as large as a double fist in the right lumbo-costal region, so that it could be felt from behind forward, and protruded behind. This mass was fairly resistant, but still fluctuating, excessively tender to the touch, and had a smooth surface. There was no movement in this mass with respiration. Her temperature when she came to the hospital was 101.5°, with a history of its having been 104° the night before. The amount of urine passed for the first twenty-four hours after entering the hospital was 700 c.c.; urea in the first twenty-four hours three per cent; a trace of albumin; no sugar; one or two granular casts; no blood, but some pus corpuscles. She suffered no distress in the bladder. She did not urinate any more frequently, or really as often, as normally. The urine was thoroughly centrifuged, and a specimen examined for tubercle bacilli and none were found. The white blood count was 10,200. She remained in the hospital three days under observation, when a sudden high temperature and delirium developed and operation was performed in the night by the usual incision for opening the kidney behind, parallel with the last rib. The fatty capsule was found, opened, and stripped back. In palpating the kidney we found it to be three times its normal size, and moving with respiration. When examined previous to anæsthesia, it did not move with respiration, but after opening the back, it moved up and down easily. Its color varied from a whitish to a pale gray, it fluctuated, and its central portion was soft and friable. There were no special adhesions.

After packing around with plain gauze, an incision was made in the center of the fluctuating portion, and between eight and ten ounces of dirty, grayish-white, purulent material was drawn off, which had a disagreeable odor, the odor of sulphureted ammonia, and there was considerable gas with it. At first, I thought from the odor that I had opened an appendiceal perinephritic abscess. Three provisional sutures were put in fascia and skin, with plenty of gauze, and one tube which was left for drainage. No exploration of interior of abscess was made because of weak condition of patient. A culture showed pure colon bacillus infection, and no other.

There is very little that can be said about the case from that time on until April 4, when she left the hospital, having been there for nearly two months. She progressively improved, but there was no increase in amount of urine through the bladder. The bladder never seemed to excrete more than six or seven hundred c.c. in twenty-four hours. The pus disappeared, and she continued to drain urine through the wound for another month after she left the hospital. This urine was of excellent quality, and sometimes it required as many as five or six dressings a day to catch it all. Estimating the urine which came from the other kidney and from this kidney, we had the normal amount and almost normal quality. The urea most of the time ran between 1.3 and 1.7 per cent. She went on for another month at home passing her urine in this way, and then the urine stopped coming from wound for a day or two, when her temperature immediately arose, and her previous symptoms returned. The sinus then opened, letting the urine out again, which had a colon bacillus odor. She was re-admitted to the hospital on May 16, with the intention of having the remainder of the kidney removed, or of saving it if I thought I could do so. I kept her under observation two or three days before operating again, and then with a large lumbo-iliac incision disclosed the following peculiar condition. (Here Dr. Morgan illustrated on the blackboard the peculiar condition of the kidney which he found.) A distinct kink in the ureter, a large sacculated pelvis, and the middle portion of the kidney also sacculated (Diagram). On examining the two poles of the kidney, I found perfectly normal kidney tissue, with the exception of the capsule, which was thicker than normal. Sections of each pole, examined with the microscope, showed excellent secreting renal tissue. In this second operation I made up my mind that I would attempt to save this secreting kidney structure. I first opened the sac, and pulling the kidney out through the wound, I found this sac lined by a similar kind of granulation tissue, which we get with chronic endometritis. I took my curette, scraped it off, and in doing so found a good, red base, on the flat surface of each pole. Then I cut away with scissors all of the renal sac-wall, and a portion of the sac of the pelvis, so as to reduce the size of the whole sac, which was as large as a pint cup. With the object in view of finding a ureteral obstruction, possibly a calculus. I opened the ureter two inches below the sac, and passed a sound easily into the bladder without any resistance. In passing a sound upwards, however, I could not get into the pelvis of the kidney on account of a kink of the ureter which was hidden from sight by bands of adhesions. I then adopted the same method which Fenger brought out some years ago, and which, I believe, was suggested to him by the Heineke-Mikulicz operation, (Demon-

stration), viz., dividing all adhesions, longitudinally splitting the valve-like kinks and re-uniting horizontally, thus converting a narrow-necked and pouched funnel into a wide-necked one. I then united the poles of the kidney, and the cut edges of the pelvis with interrupted pyoktanic catgut sutures so as to present the appearance in Diagram 2.

For the first few days, in order to be sure the ureter would be kept open, I passed a soft catheter down through and into the ureter far enough to get past the former obstruction, and was more than gratified to know, when I took the catheter out five days later, that no more urine flowed through the wound. In fact, it did not leak for the first two or three days any more than three or four drams in twenty-four hours. Inside of a month it was healed, and the ureter drained nicely. The patient is now working as a trained nurse in the East. According to an analysis of her urine, with the exception of a few pus corpuscles, it is practically normal urine, and she is passing nearly 1200 c.c. in twenty-four hours.

DISCUSSION

DR. L. L. MCARTHUR: A word in regard to enormous saccular dilatations of the kidney pelvis. I have in the past year had three such cases. In two of these, in clamping-off, as I thought, the diseased kidney and its pedicle, I really clamped through a very large pelvis, like the one described by Dr. Morgan. I found, when the kidney was removed and the clamps taken off, I still had an enormous pocket, lined with mucous membrane communicating with the ureter. In those two cases, trauma was the cause of the kidney trouble, occurring one or two years before; a blow from the shaft of the wagon in one case, falling over the corner of a box in another case. I have rather concluded that these saccular dilatations of the pelvis of the kidney frequently occur as a result of trauma.

I have had one case of oblique implantation of the ureter in the pelvis, with consequent dilatation of the kidney. By correcting the kinking of the ureter, after the method recommended by Doctors Morgan and Fenger, I had a good result.

DR. EDWARD H. OCHSNER: The case that has been reported to us by Dr. Morgan is of so much interest that I cannot refrain from calling attention to two points: First, the fact that the tumor mass did not move with respiration when the patient was awake during the first examination, but did move with respiration when the patient was anæsthetized and the tumor exposed. I have noticed this fact several times in cases of pyonephrosis, and it simply is another illustration of the fact that the classical text-book signs usually fail us when we most need them. I have observed that as soon as a patient is thoroughly anæsthetized, and especially after incision has been made down to the kidney, a pyonephrotic kidney will move up and down with respiration; while as long as the patient is awake, or only partially anæsthetized, it will not move at all with respiration. I believe the reason for this is the fact that the muscles on the side of the lesion, as well as the diaphragm, are restricted in their motion because of the inflammatory process.

Second, in reference to packing an infected kidney after nephrotomy: I have seen several severe secondary hemorrhages because the gauze was allowed to come directly in contact with the cut surface of the kidney. A drained kidney sometimes bleeds profusely, especially if one has cut through healthy tissue, and one is greatly tempted to pack it immediately and leave the packing in place. This I believe is a serious error. Primary hemorrhage from an incised kidney is not dangerous and can easily be stopped by firm pressure with a hot pad, while secondary hemorrhage is extremely dangerous. I believe the danger from secondary hemorrhage can be greatly reduced if one will pack the incised pyonephrotic kidney, using gauze and rubber tissue, or rubber dam, in such a way that the pressure is made by the gauze upon the rubber tissue, and the rubber tissue upon the cut surface of the kidney, avoiding as much as possible direct contact between the gauze and the cut surface; in other words, a very carefully applied cigarette drain. When this drain is removed it is not nearly so apt to draw the thrombi out of the larger vessels.

DR. JACOB FRANK: I have been very much interested in Dr. Morgan's case, and am very glad he brought the subject up and illustrated it so nicely. I think the good result he obtained must be attributed largely to the fact that the infection was from the colon bacillus. Had it been a tubercular infection, the post-operative result would not have been as good.

The question arises, Did the infection take place through the ureter, through the pelvis, or around the kidney? Or, did it commence with a perinephritic abscess, and work its way into the kidney down into the pelvis? Or did it begin in the ureter, or the pelvis, and work its way out? From the description given by Dr. Morgan, I am inclined to think that there was a perinephritic abscess in the first place, which afterward worked its way down into the pelvis. There is only one thing he might have done before the operation, and that is, to have tried to determine whether a ureteral catheter would have passed through the ureter, in the en-

deavor to find the stone by cystoscopic examination, which would not have necessitated the opening of the ureter; although in opening the ureter, as he says, he accidentally found through the opening that the ureter was kinked. Therefore, it would be better, probably, in a case of suspected stone, where the urine does not come down, to adopt his plan, and open the ureter and find out.

In a paper I presented before the Society some years ago, I pointed out that in abscesses of the kidney it is better, if one decides to resect a kidney, to operate in two sittings. First, to drain, wait until the parts have contracted, get them in a fairly aseptic condition,—and in this case it was fortunate Dr. Morgan did this, because he had time to find out the nature of the infection.

DR. MORGAN (closing the discussion): With reference to hemorrhage in this particular instance, it did not bother me either in the first or second operation. It is my custom, when a kidney bleeds during operation, to make pressure on both sides of the kidney, as I find that if I can get it between my hands and make pressure for a moment or two, the kidney will stop bleeding. Once in a while a kidney will bleed profusely, and then it may be necessary to use a light ligature with a curved needle. But, as a rule, I find moderate compression of the kidney from the outside will control hemorrhage; and especially is this so in cases of nephropexy, when we bring the kidney out through the lumbar wound, and thus interfere with the return circulation from its poles when we strip the capsule off. In such a case the hemorrhage can be stopped, not by making pressure on the abraded surfaces, but simply by grasping the kidney with one or both hands and squeezing it together, holding it there for an instant. I never use the iodoform-gauze around a kidney unless it be tubercular; I put a little bit of iodoform-gauze on the tubercular spots or where I have curetted the spots away. I am afraid of iodoform, because I once had a severe fright from its use.

I did a nephropexy and adopted a method which I read about in some German medical journal. Instead of putting in sutures, I introduced a strip of 10 per cent iodoform-gauze above the kidney, and within forty-eight hours the patient had violent iodoform poisoning. I did not recognize it as iodoform poisoning until I smelled the iodoform in her breath and I caught on then. She recovered, but I have never put iodoform-gauze around the kidney since.

The peculiar thing about the pathology of this case is that the infection involved the pelvis of the kidney and a central section of the kidney bearing the poles intact; while the ureter seemed to be perfectly normal all the way through from the pelvis down, with the exception of the kink. I do not claim such an operation would be feasible in a case of pyelitis, with pyelonephritis of the ordinary type, or where there are multiple abscesses. I do not think such a kidney would be worth saving. The thing that induced me to save this kidney was the fact that the poles had good tissue. Any kidney tissue that was secreting eight to ten ounces of urine a day, or sometimes more, I knew was worth saving. I do not think infection began with a perinephritic abscess, because there was nothing in the cellular tissue around the kidney to indicate any such factor. I did not like to open the pelvis of the kidney and attempt to explore from there, because with a funnel-shaped sac one is liable to lose the sound on one side or the other unless he has a delicate touch; while if we open the ureter five or six inches below the kidney, we can feel upwards or downwards, and we have a long range of operation.

I agree with Dr. Frank that the two-step operation is the only one to use where we have an acute infection of the kidney, whether we are going to resect the kidney or not. With an acute infection of the kidney or its pelvis, we should be satisfied first with simply draining the kidney, and let the patient get better before attemping future treatment.

TABETIC FRACTURE OF THE OS CALCIS

DR. D. N. EISENDRATH: The first case I wish to show is an extremely interesting one from a diagnostic standpoint.

A year ago last December this man was sent to me on account of a supposed injury of the left ankle joint. I examined him, and found that the entire ankle joint was very much swollen, but the swelling was most marked over the os calcis. Upon inquiring as to the history of an injury, patient stated that he did not hurt himself in any way, so far as he could remember. I found that I could take the posterior portion of the os calcis and move it about; I could elicit some crepitus there, but it caused no pain. We examined him further, and found he had the Argyll-Robertson pupil; loss of knee jerks, but at that time there was no tabetic gait, and Romberg's symptom was not marked. We made a diagnosis of tabetic fracture of the os calcis. I did not see the man for over a year. He came to see me three weeks ago, saying that he had been driving an automobile all this time, and had been able to run the machine with perfect safety to the occupants, but, he said, in running the automobile he had rubbed his arm constantly (his right ulna) against a portion of the machine, and that

he suddenly found he could not use it. When I saw him two weeks ago, there was a distinct false point of motion at the middle of the ulna. At the same time, we took a picture of the os calcis, which showed that under the treatment given a year ago, that is, giving him iodides for a short time, the os calcis had united perfectly, and with the exception of one fragment (the upper), which looks more prominent, one could hardly see any traces of a fracture. The ulna showed that there was very little callous formation, but under large doses of iodides he began to have an immense bony callous formation. I will ask him to pass around so that you may notice the marked tabetic gait.

The case is of considerable interest in this respect: In the Cook County Hospital we get from time to time cases of fractures which are resistant to treatment. These cases are sent in as instances of ununited fractures, and were it not for the fact that we bear in mind the possibility of tabetic fractures, our experience would be quite difficult. Not long ago a case of this kind of supracondyloid fracture of the humerus was sent in, which had existed four weeks without union. The patient was kept under observation for three or four weeks before a diagnosis of tabes was made, and shortly after the patient began taking large doses of the iodides, healing took place.

REMOVAL OF A SAFETY-PIN FROM THE TRACHEA

I want to show a number of X-ray plates. First, I wish to report a case of removal of a safety-pin from the trachea. A child, five years old, swallowed a safety-pin last July. The boy had two or three safety-pins in his mouth, and swallowed one of the second size. I did not see the boy until September of this year. At that time the history given was this: The boy was in the country, where they examined him with a fluoroscope, which is an unsatisfactory method of examining these cases. This examination was made in Central Illinois, and they could not find the safety-pin. The little fellow had repeated attacks of coughing, and during one attack his temperature went up to 105°, so that a diagnosis of diphtheria was made, and he was given large doses of antitoxin. We found that the safety-pin was lodged at the bifurcation of the trachea; it stood on edge above the sternum. He had repeated attacks of coughing, with strangulation. His temperature was 102°. I asked Dr. Pierce to pass the Killian instrument and try to get the safety-pin out through the larynx. The boy was anæsthetized with that object in view, and we were ready to do a tracheotomy, if necesssary. He was unable to pass the Killian instrument on account of strangulation. Dr. Pierce advised that the Killian instrument be tried no longer. Dr. Ingals, of this city, has had a recent similar experience in which he had to give up the Killian instrument and do a low tracheotomy. We did a tracheotomy, grasped the pin with forceps, and pulled it out.

Immediately after the operation the boy's temperature ranged from 103° to 105°; it continued at intervals to reach 101° in the morning to 105° in the evening. We examined his mediastinum and the tracheal opening for sepsis; also had an internist examine his lungs, but he could not discover anything other than that the patient had a septic broncho-pneumonia, which was a repetition of what he had before the safety-pin was removed. Acting on a suggestion that these cases of broncho-pneumonia do best when they have a change of climate, we sent him home without further treatment, and at the end of the week his temperature was normal.

FRACTURES OF THE METACARPAL BONES

The next X-ray plates I wish to show concern a subject which is just beginning to be known, and that is, fractures of the metacarpal bones. We now make it a practice to examine every case of injury of the hand, especially those in which pain persists for some time, and in quite a large proportion of them we are beginning to find that the cause of the pain is a fracture of the metacarpal bones.

This X-ray plate shows a typical fracture of the metacarpal bones of the index finger, middle finger, and ring finger. These metacarpal bone fractures are oftentimes not diagnosed, but treated as cases of sprains of the hands, and it is not until callus appears or forms that we are able to make the diagnosis.

There are a number of interesting articles on the subject of fractures of the metacarpal bones; one recently by Schultz, who divides these fractures into those of the shaft and those of the ends. Those of the ends are classed as articular fractures, and those of the shaft as belonging to the transverse variety, and most of our X-ray plates are of that variety.

This plate shows a transverse fracture of the shaft, with a moderate amount of displacement. The displacement is distinctly shown. Schultz advises in every case, where there is suspicion of fracture of the phalanges, that two views be taken; namely, an antero-posterior view, and a lateral view.

The majority of these transverse fractures are due to direct violence. Men get their hands crushed. Here is an X-ray plate of the oblique variety of fracture close to the articular end. In the oblique variety there is usually considerable

displacement. Here is a plate showing considerable displacement in a case of metacarpal fracture.

Last of all, I want to show something that was called to my attention yesterday. After speaking on fractures of the lower end of the humerus, one of the students at the college called my attention to the condition of cubitus varus following a fracture when he was ten years old. He is now twenty-two years of age. It illustrates very prettily what Stimson called attention to in the *Annals of Surgery*, in 1892. It was formerly supposed that fractures of the internal condyle were the only variety followed by a cubitus varus. There would be a fracture of the internal condyle, for instance, and that would slip up and produce a cubitus varus. That is never produced by that variety of fracture, according to Stimson, but is due to supracondyloid fracture, and there is angular deformity. We are not apt to have a cubitus varus resulting from a supracondylar fracture. This X-ray plate shows it very well, and it can be seen by examining the boy's arm; the internal condyle is on a much higher level than the external.

DISCUSSION ON DR. EISENDRATH'S CASES

DR. WILLIAM E. MORGAN: I was glad to see these skiagraphs of fractures, because they are exceedingly interesting.

The case of safety-pin in the trachea was interesting to me especially, as not long since I had a case in which a safety-pin was lodged farther down, in the right bronchus; and the Lord was with me in that case or I would not have gotten that pin out. I did a low tracheotomy and tried to see where the pin was. I knew where it was from the skiagraphs. I was puzzled to know how to get to look down into the trachea far enough to see into the right bronchus and find the safety-pin. I did not want to put a forceps down there and feel for it without seeing it, for fear I might push it farther, and if I should push it farther, I would never get it. I had in my instrument case a piece of silver tubing, larger than the largest tracheotomy tube and the tracheotomy tube did not have the right curve for looking down. This piece of silver tubing was used at a bladder drainage tube for a while; I threw it aside as being worthless, still it was lurking around always in the way. The idea occurred to me that I could use that piece of silver tubing. I did a low tracheotomy, inserted this tube, and at the end of it I could see the pin, which I pulled out with a pair of forceps. It was an open safety-pin, with the open portion pointing upward. It would have been an easy thing to grasp, but in so doing one might drag the patient's windpipe all to pieces. I have been thankful since that that old piece of tubing stayed in my way so many years, because it did me such good service at the time.

The case of specific fracture was interesting to me. I would hardly like, however, to attribute pathological nodes and fractures directly to a tabetic condition. May not that be simply a coincidental affair, and the fractures not due to the tabes? If he only had a single healed fracture, I would be more inclined to believe positively in the neural theory as to the origin of this fracture; but having involved also the forearm, and the two fractures being so far apart, I should be rather inclined to think that these fractures were due to specific nodes in the bones and to the patient's violent exercise, jumping, etc., and the bones happened to break at the point of pathology, rather than to the tabes. Still, that it largely a matter of guesswork. We know that if this man has had syphilis, the iodides will do him good.

DR. A. B. KANAVEL read a paper, by invitation, on Leontiasis Ossea. (See paper, *ante* page 719.)

DISCUSSION

DR. H. KAHN: I have examined the ears and upper air passages of this patient. The ears show the external auditory canal is not contracted and the membrana tympani practically normal. The tuning-fork and voice tests were unreliable, except one, which was striking. The higher tuning-fork, C4, perception was much shorter than normal, showing possible involvement of the internal ear. The nasal cavities by anterior rhinoscopy, both right and left, are occluded, with the exception of a narrow slit between the lateral wall and septum on both sides. The septum is comparatively straight on the left side, the outline of the anterior end of the middle turbinal can be made out; but the inferior turbinal seems to be fused with the floor of the nose, exhibiting a sort of projection, and completely obliterating the inferior meatus. On the right side the cavity is somewhat narrower than on the left; and no vestige of the middle turbinal can be observed by anterior rhinoscopy. The inferior turbinal on the left side is fused with the floor of the nose and obliterating the meatus. The mucous membrane of the nose is altered, being of a grayish-pink, and has a soggy, infiltrated appearance. In both nostrils we find a slight amount of white, thick, very odorous or ill-smelling pus. We could not determine the place of origin of this pus on account of the narrow nasal cavity. Posterior rhinoscopic picture shows somewhat narrow choanal openings on both sides. No inferior turbinal was visible, and only a large projecting mass on each side in the place of the middle and superior turbinal. The patient has a complete anosmia, as

is noted by Dr. Kanavel. The vault of the nasopharynx, especially toward the left side, contained pus. The pharynx was somewhat redder than normal, was dry and shiny. The larynx was negative. As to the roof of the mouth, the hard palate was broad and arched, with a tendency toward the Gothic form, and the rugæ of this portion of the mouth were large and very prominent.

DR. ALEXANDER A. GOLDSMITH: I have only a few words to say. The bone was hard and on section shows the ordinary bone lamellæ and bone corpuscles, and also the Haversian canals. On account of the difficulty in decalcifying the structure, I was unable to find osteoblasts or osteoclasts. One part shows, in addition to bone, tissue which may said to resemble, somewhat, sarcoma. Someone has reported a case showing similar tissue, but there is not enough of this structure to be certain of it. On account of the poor staining power, the cells are not definite in their outline.

DR. D'ORSAY HECHT: I agree substantially with what Dr. Kanavel has said in reference to the surgical possibilities in this very uncommon, hence all the more interesting, morbid process — leontiasis ossea. The several points of neurologic interest in this condition are my only justification for offering a few desultory remarks.

Dr. Kanavel is to be congratulated for bringing to the attention of this Society a subject presenting a surgical problem which from operative premises, strange to say, has been only half-understood or altogether neglected. In any surgical undertaking a thorough understanding of the underlying pathology is essential to the result; but in leontiasis ossea and the larger group of conditions with which it is commonly classified, the pathology remains a closed book. In neurologic literature this disease receives mention in association with allied disorders, such as acromegaly, myxedema, hyperostosis cranii, and gigantism, under a family name, the "Tropho-Neuroses," but our search for an adequate explanation and localization of a "tropho-neurotic" center and its function has been disappointing. I do not hesitate to say that everything with reference to it is purely speculative. Perhaps our only justification for grouping the various disorders mentioned, after this fashion, thus conceding their tropho-neurotic origin, is their occurrence in the middle time of life, their symmetrical exhibition, and their tendency to progress. One other bit of evidence in favor of a neuro-trophic origin has been adduced in these cases of leontiasis ossea by Baumgarten, who is one of the classical investigators of the subject. He found that the foramina of some of the skulls examined failed to show any narrowing, but rather a widening, of the apertures for vessels and nerves, which, to his mind, indicated a process of trophic rather than of inflammatory type. This point, I believe, is well taken and should not be underestimated.

As to the rôle played by the pituitary gland in these disorders, whether or not the perverted secretions from its glandular structure assume any importance, I believe nothing can be said with definiteness. It is, however, my personal opinion that leontiasis ossea is not a partial form of gigantism, and that the two conditions have little, if anything, in common.

Dr. Kanavel's operative suggestions in the nature of a decompression measure such as has been instituted in brain-tumor cases has something to commend it and brings the issue of intracranial pressure into discussion. The symptoms arising from encephalic tension present in leontiasis ossea apparently do not differ from those due to brain-tumor. I refer to headache, exopthalmos, optic neuritis, blindness, ocular palsies, epileptiform seizures, dysphagias, anosmia, and mental enfeeblement, any one or all of which are induced by the encroachment of bony growth on the cranial cavity as a whole and at the cranial exits in particular. But in brain-tumor cases, we have never been able to satisfy ourselves of the exact ratio between positive intracranial pressure and the existence of headache, vomiting, and optic neuritis; for so often the pressure has been demonstrated to be great and the symptoms slight, or the symptoms intense and the pressure insignificant. Headaches are presumably dural in origin, meningeal, if you please, and only when the sensory filaments supplying the dura are involved, do we have exhibited pain. It has been suggested by someone— Putnam, I believe — in dwelling upon hyperostosis cranii, that the headache which commonly follows the bony changes in leontiasis, is present as a diffuse or localized pain in about one-half the cases, and then is due rather to a disease of the bone itself (osteocopic pain) than to intracranial pressure. In this conclusion, he is upheld by Baumgarten, who states that head pain is present in leontiasis without there being evidence of attending pressure.

The vomiting of neoplasm is another enigma; whether of bulbar or vagus origin is still questioned. Optic neuritis under like circumstances has not been satisfactorily explained as a pressure phenomenon alone. Therefore a theoretical inquiry would tend to show that the criteria of intracranial pressure are not always trustworthy, whether ascribed to brain-tumor or bony invasion.

Perhaps the entire incentive for the surgical maneuver to relieve intracranial pressure comes from the careful, yet fearless work of Horsley in

England and Keen, Cushing, and Frazier in our own country. Their writings certainly prejudice in favor of a palliative measure, a decompressive operation for the relief of brain-tumor symptoms where a diffuse intracranial pressure is perhaps at fault. After all, the chief indication for decompression is an amelioration of the severe headaches and subsidence of the optic neuritis.

Dr. Kanavel, as he said, has conceived of the measure as palliative, first, last, and always, and I would subscribe to his views with this single qualification, to operate if he is reasonably sure of existing diffuse pressure. If the evidence is in favor of local tension from foraminal occlusion alone, then the decompression measure would to me seem contra-indicated or at least of little avail. Dr. Kanavel has surely thrown out a valuable hint for surgical activity in a new though very restricted field.

DR. E. F. SNYDACKER: The essayist has entered into the eye-findings so thoroughly that there is very little for me to add. One or two points, however, might be touched on a little more. That portion of the orbit which is most commonly involved in this rare disease is the inferior margin. This brings with it a complication that is often annoying and dangerous — the lachrymal passages are occluded; tears and mucus secreted by the eyes stagnate in the sac; we get blenorrhea of the sac; the eyes are constantly bathed in pus, and we have dangerous corneal complications as a result. When proptosis is present, the visual axes are no longer parallel, consequently binocular vision becomes impossible. Diplopia ensues, and one of two things occurs; the patient must learn to suppress the image of the displaced eye, or the eye must be occluded. In either case the function of the eye is absolutely lost and the patient is practically blind in that eye. Therefore, it seems to me, where an eye is displaced by exostosis in the orbit, it is indicated, and a perfectly rational thing to do, is to remove that exostosis. As Dr. Kanavel pointed out, where blindness does occur it occurs from purely mechanical causes. These may be intracranial or orbital. It is important to make a differential diagnosis, so far as doing any good is concerned, as to whether the condition is an intracranial or orbital one, because I think an orbital condition can be easily relieved, but I am inclined to doubt whether the condition can be relieved if it is intracranial. The differential diagnosis should not present very many difficulties. In the first place, we have the X-ray, which would help us materially. If the condition is intra-orbital, we usually have displacement of the eyeball. Almost invariably, as the docter showed, blindness resulted where the eyeball had been displaced. Then, of course, we can do the Krönlein operation or osteoplastic resection of the outer wall, which gives admirable access to the orbit, and absolutely determines whether the condition is orbital or not.

Some years ago I helped Dr. Hale in a Krönlein operation, and we were able to see not only the outer portion of the orbit, but to get a good view of the optic nerve and canal, so that it is easily possible through such an operation to determine accurately whether the compression is intra-orbital, and if so, it could be relieved with ease. I should regard a surgeon as remiss indeed who would sit by and let a patient become blind from intra-orbital compression where it is possible to relieve the condition effectively by a simple operation, and one that is not at all dangerous.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D. — E. WYLLYS ANDREWS, M. D.
FREDERIC A. BESLEY, M. D. — WM. R. CUBBINS, M. D.

STUDIES IN VESSEL SURGERY — CIRCULAR ARTERIAL SUTURE AND VESSEL TRANSPLANTATION. By Dr. R. Stich, Privat Docent; Dr. M. M. Makkas, Assistant; Dr. C. E. Dowman; from the Breslau Surgical Clinic, Prof. Garré, Director.

These investigators made a series of 31 experiments on various animals, making resections and transplantations of various vessels. A short review of the most important articles upon the subject of vessel suture, which have appeared up to the present time, is given. The work of Carrel, Payr, and Murphy is particularly spoken of.

The experimental operations are tabulated as follows:

1. Circular arterial suture	7
2. Circular vein suture	2
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I. TECHNIQUE

In order to facilitate the placing of sutures, 3 traction threads are introduced into the cut edges of the vessel at points equidistant from each other. By traction upon these, the curved edges of the vessel are made straight, becoming, in fact, an equilateral triangle instead of a circle. Into these straight and firmly-held edges, the sutures are much more readily introduced than into the curved and loose edges without such fixation.

1. *Needles.* Extremely fine intestinal needles were used, 15 mm. long, of a diameter of 0.25 mm. and curved to ⅓ of a circle.

2. *Suture material.* The finest of intestinal silk was employed. This was boiled one-half hour and kept in sterile liquid paraffin, the oil causing the silk to be very smooth and easily drawn through, and holding all the finer fibers in close contact. The strength of the silk was not impaired thereby.

3. *Chemical disinfectants* were avoided in order to avoid any damage thereby to endothelium, and to diminish any tendency to clot formation.

4. *Clamps.* The blades were covered with rubber-tubing and over this were two layers of gauze, in order to avoid slipping. The clamps described are those of Höpfner. The authors state that by careful handling no lesions of the intima occurred.

5. *Asepsis.* Of the most painstaking kind. In spite of care, some superficial infections occurred by the animals scratching, etc.

II. SPECIAL TECHNIQUE

1. Isolation of 6–10 cm. of the vessel. It is not necessary to dissect away all of the periadventitial tissue. 2. Application of clamps. 3. Severing of vessel transversely and resection of a portion. 4. Removal from vessel-ends of any remaining particles of periadventitial tissue. Removal of any blood remaining between the clamps.

5. Place and tie the three traction threads, everting edges so endothelial surfaces come in contact. Completion of anastomosis by running suture, starting on inner wall of vessel, and passing through entire thickness of wall. 6. Removal of clamp hemorrhage through stitch holes was as a rule controlled in 3–5 minutes by compression.

III. RESULTS

1. *Circular Arterial Suture.* Of 6 cases, 5 were successful, the artery being found patulous after 4–150 days had elapsed. The sutures were usually still visible within the artery.

2. *Vessel Transplantation.* (*a*) Two successful cases of transplantation of a piece of an artery into a defect in another artery in an animal of similar character; a portion of femoral being put into the carotid and *vice versa.* (*b*) In 5 cases a portion of an artery was taken from another animal which had been killed by $CHCl_3$, 15 minutes to 1½ hours previous to the time of experiment. In 2 of these cases failure is recorded. (*c*) Transplantation of a portion of vessel from an animal of another species. Of 6 attempts, 3 were successful.

3. *Vein Transplantation* —placing a portion of a vein into a defect in an artery. Of 6 cases, 2 successes and 4 failures are noted.

4. *Circular Anastomosis* between artery and vein. Of 3 attempts all failed.

5. *Circular Vein Suture.* Two cases, 1 failed, 1 succeeded.

IV. CONCLUSIONS

1. The uniting of severed arteries is possible in both large and small arteries, without especial difficulty, by means of the method noted. This method — correct technique and asepsis being assumed — restores the function with great certainty.

2. For replacing lost portions of arteries it is found best to use material taken from the same individual, or from another animal of the same species; for example, from freshly-amputated limbs.

3. It is, however, possible to implant portions of arteries from freshly-killed animals of the same species.

4. It is also possible to implant such material from animals of another species.

5. It is possible to implant a section of a vein into an artery. The wall of the vein soon becomes much thicker and is able to withstand the arterial pressure.— *Beiträge zur Gefässchirurgie — Cirkuläre Arteriennaht und Gefässtransplantationen. Beiträge zur klinischen Chirurgie,* vol. liii.

W. C. DANFORTH, M. D.

SUTURE OF BLOOD-VESSELS, IMPLANTATION AND TRANSPLANTATION OF VESSELS AND ORGANS. AN HISTORICAL AND EXPERIMENTAL STUDY. By Stephen H. Watts, M. D., of Johns Hopkins Hospital.

This article is extremely interesting and instructive from several points of view. It is impossible to abstract it properly as a whole, and anyone is advised to study it carefully to get its true value. The historical reports are complete, and the bibliography exhaustive, showing without any modification just what has been accomplished along this very interesting line of study. The author's own experiments are carefully planned and the reports concise. The suture of arteries and veins was performed after the method of Carrel, and in all cases was successful. The intima regenerated rapidly. There was also a regeneration of the elastic fibres, except those of the inner elastic membrane, where there was no apparent proliferation of elastic tissue. The muscularis seemed also to show some ability to proliferate. Where the proximal end of an artery was joined to the distal end of a vein, the vein became dilated and the walls hypertrophied. This hypertrophy was due to an increase in the size and number of the structures in the wall, except the elastic fibres in the media and adventitia. These seemed reduced in number. In the veins there were also elevated white patches on the intima which resembled atheroma macroscopically, but with the microscope no areas of degeneration were found. The thickening was composed of the subintimal connective tissue and there was very little elastic tissue in the center, although around the edges of these pseudo-atheromatous planks there was an increase of the elastic fibres. Clinically, the vein became very much dilated and there was a bruit over the point of anastomosis. The parts applied by the vein became very edematous and remained in this condition for several weeks, after which time it began to get smaller, but it never regained its normal proportion during the life of the experiment. The artery, whose distal portion had been joined to the proximal portion of the vein, was atrophied and did not take on the functions of the vein. In the latter anastomosis of arteries and veins, the blood current of the artery was short-circuited back toward the heart, and did not add to the peripheral circulation at all. These openings also showed a marked tendency to close spontaneously.

The auto-transplantation of arteries and veins was not very successful, because of the interference with the blood supply of the transplanted portion and the large amount of handling that was necessary during the operation. The results show conclusively that completely divided vessels can be sutured with almost uniform success, when the asepsis and technique is good. The intima can be included in the suture with impunity, the application of the suture being thus greatly facilitated.

The transplantation of organs was not successful and the author lays his failure to errors in technique. The author believes that asepsis and exact suturing cannot be too carefully followed. He also believes with Carrel that there may be a minor grade of infection, not severe enough to cause pus but enough to cause thrombosis in an injured vessel.— *Bulletin Johns Hopkins Hospital,* Baltimore, May, 1907.

WM. R. CUBBINS.

REPORT OF A CASE OF HEMOPHILIC KNEE-JOINT. RECOVERY UNDER THE USE OF THYROID EXTRACT. By J. T. Rugh, M. D., Philadelphia.

A case of recurring trouble in the knee-joint was operated and found to show the condition of a hemophilic joint. There was no bleeding at the time of the operation, but it began after the patient had been returned to bed, and continued to ooze several weeks, during which time it was impossible to check it. Gelatin and adrenalin were tried internally with little effect. Finally the patient was given thyroid extract, five grains three times

a day, with an immediate and marked improvement. This improvement has continued until the present time, and the knee shows no signs of trouble.— *Annals of Surgery*, May, 1907.

WM. R. CUBBINS.

METHOD OF USING THE TONGUE IN SUPPLYING A DEFECT OF THE CHEEK. By Willard Bartlett, M. D., St. Louis, Missouri.

The patient was a man with carcinoma of the cheek that had perforated so that it was necessary to remove all of the mucosa. The teeth upon the diseased side had previously been removed. In removing the tumor, it was found that so much of the mucous membrane of the mouth had to be sacrificed that the edges could not be approximated. So a horizontal cut was made in the side of the tongue, and the tongue split almost to the median line. The cut edges of the mucous membrane of the tongue were then sutured to the cut edges of the mucosa of the cheeks, leaving a raw surface external. The skin of the face was then dissected up and carefully approximated. The wound healed primarily and the patient has suffered no difficulty in chewing, talking, or swallowing; and the tongue, although firmly fixed, still has a wide range of movement.— *Annals of Surgery*, 1907.

WM. R. CUBBINS.

THE CONTRIBUTIONS TO THE STUDY AND TREATMENT OF IMPASSIBLE NON-CANCEROUS STRICTURES OF THE ŒSOPHAGUS. By Gross, M. D., and Sencert, M. D.

All strictures of the œsophagus should be carefully inspected with an œsophagoscope before concluding that they are impassible, because one is thus frequently able to see the small stricture, and to introduce a dilating instrument. Where the blind seeking of such an opening with a bougie would be dangerous and unsuccessful, if the sacculation above the stricture should be marked, and ulcerated, it is safer to attempt a retrograde dilatation than to risk dilating the inflamed tissues. This can be done best by a method of the author's, by which a small opening is made in the anterior wall of the stomach, and an œsophagoscope is passed in through the cardia, with the purse-string around the gastric opening to prevent leakage. In this way one can make an accurate examination of the condition below the stricture, and if necessary dilate with an instrument introduced through the œsophagoscope.— *Revue de Chirurgie*, 1907, No. xxvii, 1.

WM. R. CUBBINS.

THE QUESTION OF SUTURE IN PATELLA FRACTURES. By Dr. Richard Lewisohn, from the Heidelberg Surgical Clinic, Prof. Czerny, Director.

Lewisohn reports 31 cases treated without suture, and 9 cases treated with suture, these being cases observed in Heidelberg since 1878. The cases came to the clinic at times varying from one and one half years to immediately after the injury. The greater number had been caused by direct violence. Twenty-six of these cases were examined from one to twenty years after the injury.

The technique used consisted in a curved incision (in one case a vertical incision) exposing the patella. In 6 cases silver-wire sutures only were passed through the patella; in 3 cases these were reinforced by catgut placed laterally.

The non-operative treatment consisted in the removal of the blood effusion by pressure, or by aspiration if pressure did not suffice; the bringing together of the fragments by strips of adhesive overlapping one another above and below the fracture; and massage of the limb.

In examining the cases afterward two points were considered: First, the condition of the patella itself; second, the function of the limb.

Of the 18 non-operated cases, in 8 the result was excellent. In only 2 of these was a true bony union present. The 2 best results, of all the 26 cases which could be followed up, belonged in this group. In neither of these 2 was bony union present, yet the patients pursued more than ordinarily active occupations constantly, without any discomfort.

It is of interest to note that in 7 cases in which the results were only fair, 5 showed a firm union of the fragments, and 2 a less firm or fibrous union. Three cases showed bad results. In one an ankylosis of the knee occurred; a second showed an interval of 12 cm. between the fragments; and in the third, a woman of 71, chronic arthritic processes were present.

Of the 8 cases of suture which were followed up, 2 showed bad results, and in both of these was bony union present. One of these could bend the knee but very slightly. Only one operated case gave an excellent result, and in this one the wire cut through and a considerable diastasis occurred.

Lewisohn states his conclusion as follows: "(1) A firm union of the fragments plays by no means the most important rôle. (2) The conservatively-treated cases not only compare favorably with the operated ones but even surpass them in the end-results."— *Für Frage der Naht bei Patellafrakturen Beiträge zur klinischen Chirurgie*, Vol. 52.

W. C. DANFORTH, M. D.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. Bacon, M. D. — Rudolph W. Holmes, M. D.
C. v. Bachellé, M. D. — Hugo Ehrenfest, M. D.

Chorea During Pregnancy. By William Fletcher Shaw.

Eleven cases of chorea of pregnancy are reported in this communication. The first two cases were treated on traditional lines with most unsatisfactory results. It was then decided to try a totally different antitoxemic treatment (first suggested by Fothergill), by which patients were put on a milk diet and elimination increased. In nine cases so treated the best results were secured. The idea underlying the experiment was that the toxemia of pregnancy lowers the resistance of the nervous system, and puts it in a state of heightened irritability, so that it responds to stimuli, chemical, emotional, etc., which would not otherwise produce any result perceptible by ordinary clinical methods of observation. The eleven case reports are given in detail, and a general review of the literature is added. Based upon the hypothesis above given, the treatment aims at (1) removing the predisposing cause, (2) removing the determining cause, (3) treating the symptoms if necessary.

Shaw's conclusions are:

1. The chorea of pregnancy, like other choreas is due to a toxin which appears to be identical with, or closely to resemble, that of acute rheumatism.

2. It affects human subjects under two circumstances, both of these being characterized by instability or irritability of the nervous system, namely, childhood and pregnancy.

3. The cause of the instability or irritability of the nervous system in pregnancy, bringing it down to the level of childhood, is the toxemia of pregnancy.

4. In the chorea of pregnancy, therefore, it is more important to remove the predisposing cause than to apply merely symptomatic treatment.

5. The treatment must be eliminative as in the other toxemias of pregnancy.

6. The pregnancy should not be arrested, as a rule, as this is generally unnecessary and harmful to the patient, as well as to the child.— *The Journal of Obstetrics and Gynecology of the British Empire*, vol. xi., No. 4, April, 1907.

Carey Culbertson.

Intra-uterine Rigor Mortis. By P. Van Oordt.

The writer reports a case of intra-uterine rigor mortis, in which the child occupied a normal position in the uterus, except that the legs were somewhat more extended. The condition was recognized and the labor ended after a rather difficult extraction. Two hours later the rigidity disappeared, wherefore van Oordt argues that had the labor been left to nature, the fœtus would have been spontaneously expelled, and the phenomenon not observed. He thinks that this may possibly explain the rarity of the condition. In other cases, where the child has been dead some length of time, a period of probable death preceding and labor making this certain, one cannot wait for such marked evidences as rigor mortis. In other cases no regard is given the fœtus and hence this symptom is not observed. Van Oordt finds but 49 published cases, 8 of which were complicated eclampsia. The rigidity does not seem to have been a result of convulsions, the condition having been found in 9 cases of Cæsarean section at death, or just after, 6 of which occurred in eclampsia. The writer also regards these cases as genuine rigor mortis, coming on after fœtal death, and not as muscular rigidity due to the "eklampsiegift."—*Ein Fall von intrauterinem Rigor mortis. Monatschrift für Geburtshülfe und Gynäkologie*, Bd. xxv, Heft 3, March, 1907.

Carey Culbertson.

Results of High-Forceps Operations. By C. Riemann.

Careful statistics, compiled from one hundred high-forceps operations, are contributed by Riemann. The indications for such interference were eclampsia 17 times, fever 15 times, anomalies of the fœtal heart 40 times, fœtid liquor amnii 7 times, prolapse of the umbilical cord 6 times, uterine inertia, failure of spontaneous delivery, and posterior-parietal bone presentation, each 3 times, threatened rupture of the uterus twice, and hemorrhage due to placenta prævia, and dystocia due to a cyst, each once. Three of the eclamptic patients died,

there being no other fatal cases. The fœtal mortality was 31 per cent, only 69 of the 100 babies being saved. Injuries to the maternal parts were infrequent, one cervical and two vaginal lacerations being sustained, besides two fistulæ. These statistics and others are presented in precise detail.

Riemann's conclusions are as follows: 1. The high-forceps operation is not as dangerous to the mother and child as would appear from the most generally stated objections — contracted pelvis, for instance.

2. The fœtal mortality ranges from 22 per cent to 31 per cent; maternal injuries occur in only 7 per cent; fœtal injuries in 10 per cent; and the puerperium is increased but 16 per cent. This is sufficient, however, to contra-indicate the operation, except in case of some pathologic condition placing the mother or fœtus in actual danger.

3. The best results are obtained, (*a*) where the fœtus is in good condition, with a well-moulded head, that is, when the indication for interference is a maternal one. In such cases it is possible to extract a relatively unharmed child, through a pelvic conjugate diagnalis of 8 to 8.75 cm.; (*b*) in multiparæ with a conjugate diagnalis of 9 to 10.5 cm.

4. The favorable results obtained with the high-forceps decrease in direct ratio with the increase of pelvic contracture.— *Erfolge bei hoher Zange. Monatschrift für Geburtshülfe und Gynäkologie*, Bd. xxv, Heft 4, April, 1907.

CAREY CULBERTSON.

PLACENTA PRÆVIA. O. Bürger and R. Graf state, that after a review of cases of placenta prævia treated at Schauta's clinic, they are inclined to oppose the use of Dürhssen's vaginal Cæsarian section as a method of treatment of these cases; first, because their material showed good results with other methods; and secondly, because of the hemorrhage which must necessarily accompany the vaginal section, and may be the cause of serious consequence in such exsanguinated patients. In addition to this, they oppose the operation because they believe that infection may easily take place from incisions made in such vascular tissues as the lower uterine segment. They grant that the prognosis for the child is better when the vaginal Cæsarian section is carried out, but are not willing to give this too much importance because in these cases, so frequently, the child is moribund.

After careful comparison and study of their statistics, they conclude that it is safest to do the combined version, without completing the extraction, following a preliminary dilatation of the comparatively narrow birth-canal with the colpeurynter. The results they have obtained thus compare very favorably with other statistics, especially when the danger of hemorrhage and infection in such cases is considered. The prognosis as to the children they hope will be improved, but do not believe that it will be by any radical operative procedure; and further, it should not be at the expense of the mother's life. — *Zur Statistik der Placenta prævia. Monatschr. f. Geb. u. Gyn.*, bd. xxv, hft. 1. C. V. BACHELLÉ.

MANAGEMENT DURING PUERPERIUM. Hegar discusses the choice and arrangement of the patient's room, as well as the adjoining room for the nurse and baby, and says that everything should be as simple as possible, including the patient's clothing. He recommends that the woman should be taught to pass urine in the recumbent posture during pregnancy so that she will be able to do so without difficulty during the puerperium. The diet should be light but not, as formerly recommended, of thin gruels and soups. Absolute rest on the back is his rule for the first twenty-four hours, after which the patient may be permitted to move about, and later on the sitting position is allowed, with a support for the back. At the end of ten or twelve days he allows the woman to get up, believing that a longer time in bed is detrimental to the patient's mental state, as well as to the circulation and digestion, while on the other hand too early rising is to be deprecated because of the insufficiency of involution. The temperature, the condition of the uterus and lochia, should be carefully watched especially for the first six to nine days of the puerperium. Furthermore, the obstetrician should see to it that the abdominal and pelvic muscles have suffered no permanent injury, and correct any such that may be present. In conclusion he emphasizes strongly the necessary care during the establishment and continuation of lactation, in which he says the state is also vitally interested, since in those countries in which practically all mothers nurse the babies, as in Japan and Scandinavia, the mortality among children is only 10 per cent in the first year of life, while among the Germans it is about 20 per cent. *Diätetik der Wöchnerin. Deutsche Med. Wochenschr.*, No. 47, 1906. C. V. BACHELLÉ.

BOOK REVIEWS

ESSENTIALS OF OBSTETRICS. By Charles Jewett, M.D., Professor of Obstetrics and Gynecology, in the Long Island College Hospital, Brooklyn, N. Y. Third edition, thoroughly revised. 12mo, 413 pp., with 80 engravings and 5 colored plates. Philadelphia and New York: Lea Brothers & Co., 1907. Cloth, $2.25 net.

The author believes that works of this kind, within their proper limits, have a distinct value in medical teaching. The present compact volume is intended, therefore, merely as an introduction to the more elaborate treatises and as a guide in following the didactic and the practical teaching of the college courses. This third edition has been completely revised, largely rewritten, and rounded out with much entirely new matter.

CAREY CULBERTSON.

INDICATIONS FOR OPERATION. By Herman Schlesinger, M. D., Extraordinary Professor of Medicine in the University of Vienna. Authorized English Translation by Keith W. Monsarrat, M.B., F. R. C. S. Ed., Surgeon to the Northern Hospital, Liverpool. 8mo, 490 pp. New York: E. B. Treat and Co., 1906. Cloth, $3.00 net.

The activities of surgery being at present so far-reaching, the object of this volume is to aid in settling various questions as regards indications for operation, problems so often difficult to decide. The work is not a compilation but an expression of individual opinion based on extensive experience in hospital and private practice. Ætiology, pathology, clinical course, diagnosis, and differentiation are touched upon only as they enable the practitioner, not in hospital practice, to arrive at an independent opinion on the advisability of operation in cases of internal lesion. Hence the author classifies his work anatomically and takes up the general surgical conditions. Diseases of the stomach, of the intestines, of the gall-bladder and bile-ducts, and of the kidneys and renal pelvis are given especial consideration. Strange to say, the author entirely omits mention of the diseases of the female pelvis, though he provides an appendix on indications for the induction of premature labor. Another appendix, treating of the general influence of operations on the body, is particularly well considered.

CAREY CULBERTSON.

THE ABDOMINAL AND PELVIC BRAIN. WITH AUTOMATIC VISCERAL GANGLIA. By Byron Robinson, B.S., M.D. Hammond, Indiana: Frank S. Betz & Co.

This work of 670 pages is practically an original treatise on the abdominal sympathetic nerves and their relation to the abdominal viscera. It discusses the anatomy, physiology, and pathology of the abdominal sympathetic nerves with diagnosis and methods of treatment.

In these days of multitudinous medical books, it is a pleasure to take up one containing original work. Dr. Byron Robinson's book has blazed new paths for medical and surgical thought and practice. It deals with the abdominal sympathetic nervous system, and its theme revolves chiefly around the functions of the viscera, i.e., the physiology of the abdominal and pelvic organs. Byron Robinson has done wonderful work in the study of the sympathetic ganglia and fibers of the abdomen, and has shown the automatic action of the abdominal brain in its relations to the various functions of the viscera, such as sensation, absorption, secretion and peristalsis. These functions are common to all the viscera of the abdomen and pelvis, but the abdominal brain acts in a specialized manner in the control of the genital functions of ovulation, menstruation, and gestation.

The author has interwoven with his text his well-known visceral drainage treatment, which involves modification of the visceral function by means of fluid, diet, and modification of the patient's vocation and environment.

For the practitioner who has rebelled against the gradually increasing inroads of surgery upon medical practice, and the tendency to regard anything and everything in the way of disease as surgical, there should be much consolation in Byron Robinson's statement that the future practice of medicine will revert to a point where medicine rather than surgery will predominate.

Attention is directed to the numerous natural and valuable anatomic illustrations dispersed through the work. From the X-ray numerous, excellent and suggestive illustrations are presented, not yet found in other treatises. Drawings of the X-ray from the biliary and pancreatic ducts, as well as those of the utero-ovarian artery are worthy of special attention.

G. FRANK LYDSTON.

A TEXT-BOOK OF THE PRACTICE OF GYNECOLOGY. By William Easterly Ashton, M. D., LL. D. Philadelphia: W. B. Saunders Co.

Evidence of the popularity of Ashton's work is the appearance of a third edition in a single year. The bibliography of gynecology may be referred to at one's leisure; but here is the daily work of the doctor in picture form, with 1057 excellent line drawings, accompanied by classified and emphasized comments, covering every phase of the subject in a manner so explicit that it removes much of uncertainty and hesitation from the path of the average practitioner. The changes made are the result of the author's personal experience, based upon an actual working knowledge of the recent advances in this line of surgery. The metric system has been added to the formulæ and appears in the text. Simpler and more effective methods of collecting curet findings are offered. A valuable addition is the special consideration of the relative percentage of polynuclear cells in inflammatory conditions and suppurative lesions. The chapter on constipation has been enriched by the addition of a new method of colonic flushing and colonic lavage. The author's interest in his specialty is shown in the number of practical ideas introduced, and in his conscientious attention to details, presented in a way that will be especially appreciated by those outside the large cities, where trained assistants and skilled associates are scarce.

The treatment of the troublesome condition of vaginismus has been amplified, and Hirst's operation for the cure of the affection is given in detail. An interesting chapter is the one on indoor exercises. The usual curriculum of a medical college does not permit of special instruction in this branch, so that the physician often enters upon the duties of his practice without a definite idea of its conduct or importance. We are glad to observe that Ashton devotes some space, and a number of useful illustrations, to this means of toning up a patient.

The classic operations of superficial denudations for the cure of cystocele have been discarded and Dudley's method of operating, which is based on the results of Reynold's studies of the anatomic supports of the anterior wall of the vagina, has been substituted.

Much space has been devoted to the palliative treatment of retrodisplacements of the uterus by pessaries, the operative treatment of chronic retrodisplacements has been rewritten, and Montgomery's round-ligament operation described. Special attention has been devoted to the diagnosis and treatment of inversion of the uterus, Chorioepithelioma of the uterus, and passive incontinence of urine. Additions and changes have been made in the operating paraphernalia and technique, and special directions are given for the sterilization of the mouth and teeth in the preparation of a patient for operation. The section on intestinal anastomosis is rewritten and Moynihan's methods substituted for the procedures formerly in use. W. E. DODGE.

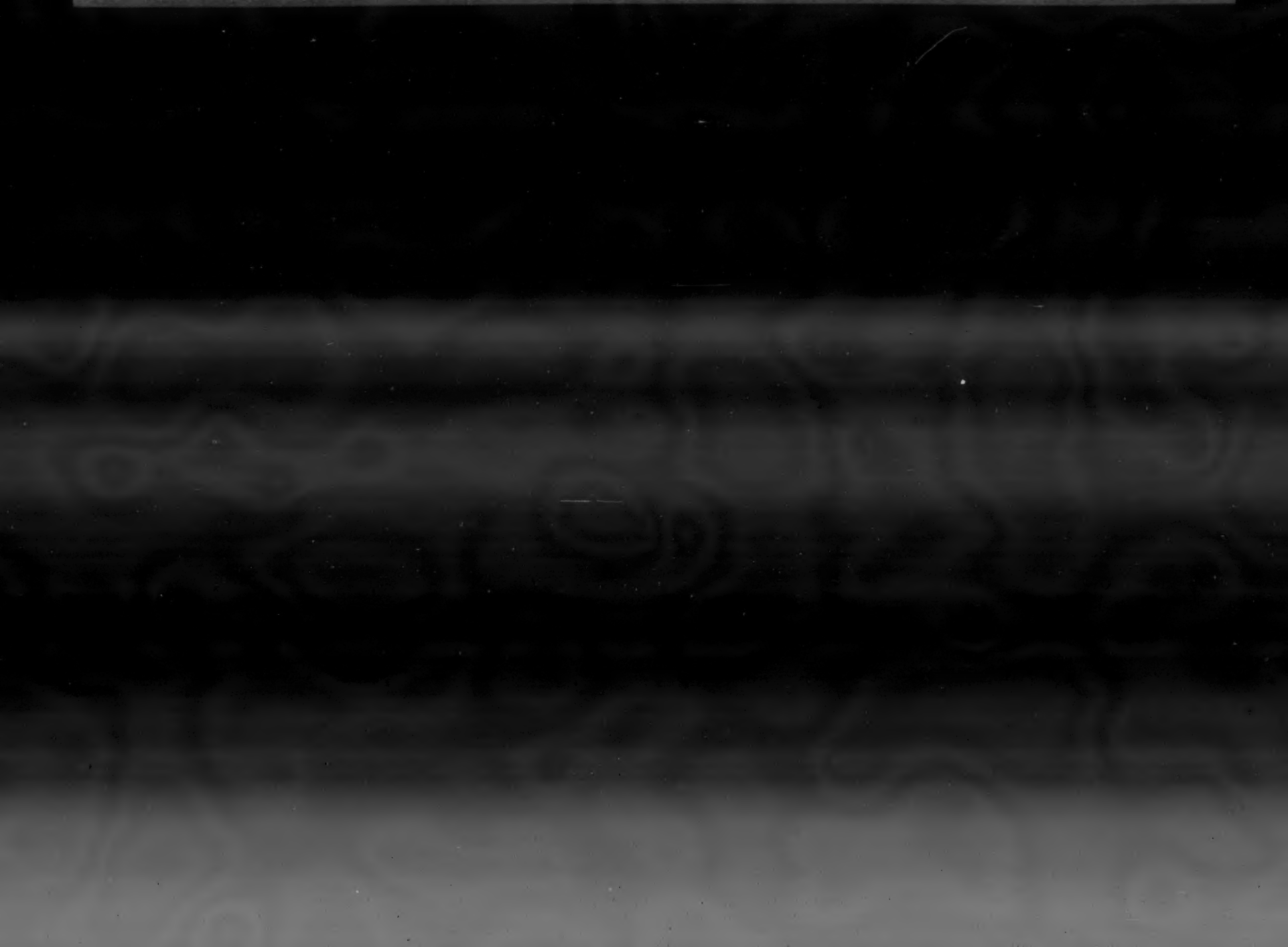
BOOKS RECEIVED

PHYSICAL DIAGNOSIS, WITH CASE EXAMPLES OF THE INDUCTIVE METHOD. By Howard S. Anders, A. M., M. D., Professor of Physical Diagnosis, Medico-Chirurgical College, Philadelphia; Physician to the Philadelphia General Hospital, Tuberculosis Department; Late President of the Pennsylvania Society for the Prevention of Tuberculosis; Member American Medical Association, American Climatological Association, American Association for the Advancement of Science, etc. 88 illustrations in the text and 32 plates. New York & London: D. Appleton & Co., 1907.

METABOLISM AND PRACTICAL MEDICINE. By Carl Von Noorden, Professor of the First University Medical Clinic, Vienna. Vol. I. The Physiology of Metabolism by Adolf Magnus-Levy, Berlin. $4.00 net. Vol. II. The Pathology of Metabolism by Carl Von Noorden, Fr. Kraus, Ad. Schmidt, W. Weintraud, M. Matthes, and H. Strauss. Anglo-American issue under the editorship of I. Walker Hall, Professor of Pathology, University College, Bristol; Pathologist to the Bristol Royal Infirmary. Chicago: W. T. Keener & Company. 1907. $6.00 net.

PARAFFIN IN SURGERY. A critical and clinical study by William H. Luckett, M. D., Attending Surgeon, Harlem Hospital; Surgeon to the Mt. Sinai Hospital Dispensary of New York; and Frank L. Horne, M. D., Formerly Assistant Surgeon, Mt. Sinai Hospital Dispensary. 12 mo.; 38 illustrations; 118 pp. New York City: Surgery Publishing Company. Cloth, $2.00.

PSYCHOLOGY APPLIED TO MEDICINE. Introductory subjects by David W. Wells, M.D., Lecturer on mental physiology and assistant in Ophthalmology, Boston University Medical School; Ophthalmic Surgeon Massachusetts Homeopathic Hospital, Boston: Oculist Newton, Massachusetts Hospital. Illustrated. 12 mo. Nearly 200 pages, with bibliography and index. Extra quality paper. Philadelphia: F. A. Davis Co., 1907. Cloth, $1.50 net.



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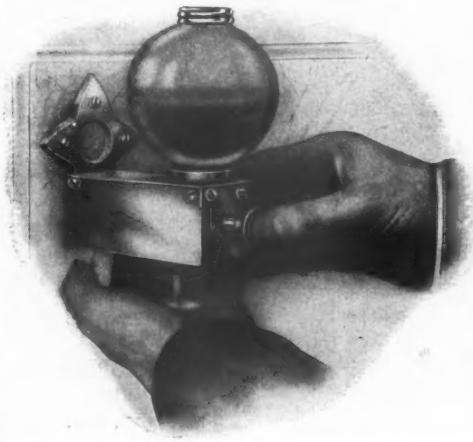

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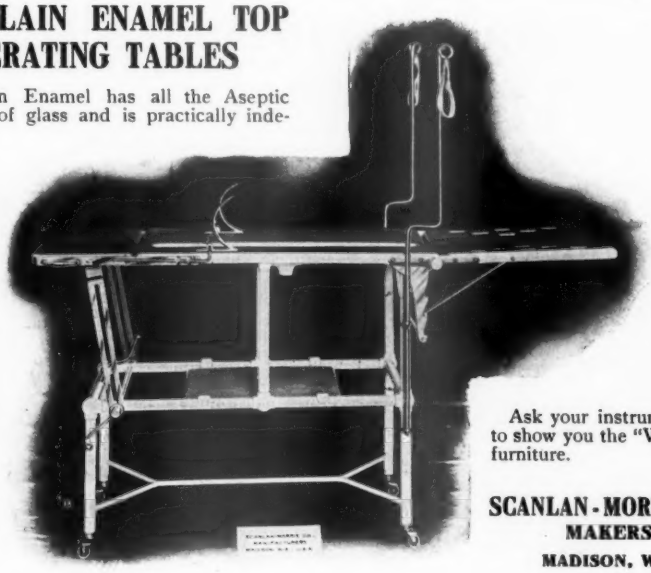

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Carbenzol Ointment, 30%; per box 20c.
Carbenzol Soap, 30%; per cake 20c.

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Do not confound with Calcium Iodide

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Surgery, Gynecology and Obstetrics

Will present the following papers read before the

American Surgical Association

At its Annual Meeting held in Washington last month:

Aneurysmal Varix: a Case of Pulsating Exophthalmos and Two Cases of Enormous Dilatation on the Cardiac Side of the Wound.....GEORGE TULLY VAUGHAN, M. D., Washington

Some Considerations in Regard to Brain Surgery.....S. H. WEEKS, M. D., Portland, Me.

Further Consideration of the Surgical Treatment of Cancer of the Head and Neck.....
..... GEORGE W. CRILE, M. D., Cleveland

A New Method of Rhinoplasty by Means of One of the Fingers.....
..... JOHN M. T. FINNEY, M. D., Baltimore

The Diverticulum Ilei as a Cause of Complete Intestinal Obstruction .....
.....F. H. GERRISH, M. D., Portland, Me.

Treatment of the Posterior Capsule of the Thyroid in Thyroidectomy .....
..... CHARLES H. MAYO, M. D., Rochester, Minn.

Continuous Passive Congestion in the Treatment of Delayed Union of Fractures .....
..... JOHN B. ROBERTS, M. D., Philadelphia

Early Operations Upon the Nerves in Ischemic Paralysis.....LEONARD FREEMAN, M. D., Denver

Report of a Case of Non-Parasitic Cyst of the Spleen.....
..... THOMAS W. HUNTINGTON, M. D., San Francisco

Papers on End Results Following Operations for Carcinoma of the Breast
WILLY MEYER, M. D., New York
FREDERICK S. DENNIS, M. D., New York
ALBERT VANDERVEER, M. D., Albany
AUGUST F. JONES, M. D., Omaha
R. B. GREENOUGH, M. D, Boston

Graduated Vertical Traction in Its Application to Congenital Dislocation of the Hip .....
..... OSCAR H. ALLIS, M. D., Philadelphia

Prostatectomy.....ARCHIBALD MACLAREN, M. D., St. Paul

Acquired Diverticulitis of the Colon and Its Surgical Treatment.....
..... WILLIAM J. MAYO, M. D., Rochester, Minn.

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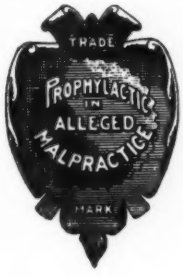

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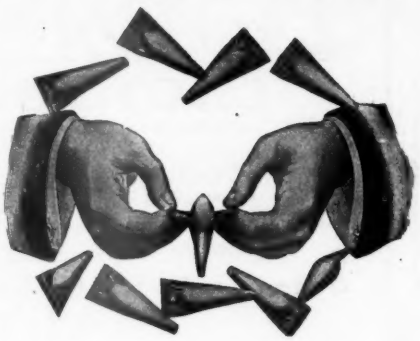

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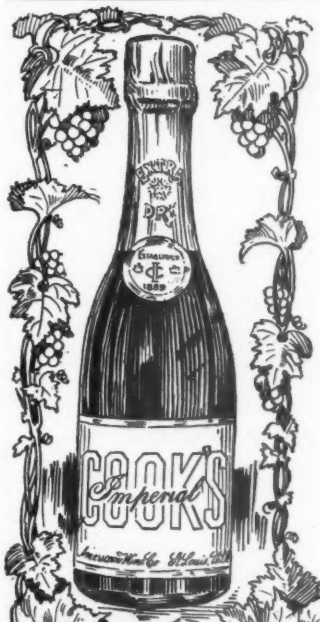

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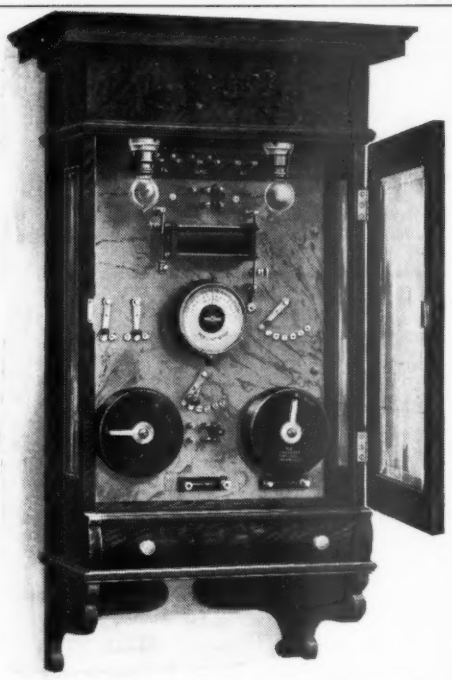

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August — Special Number

Surgery, Gynecology and Obstetrics

for the

American Gynecological Society

In which will appear the following papers read before the society at its last annual meeting held in Washington in May:

Prophylaxis in Venereal Disease—President's Address ..... CLEMENT CLEVELAND, M. D., New York
Frequency and Clinical Significance of Contractions of the Pelvic Outlet ..... J. WHITRIDGE WILLIAMS, M. D., Baltimore
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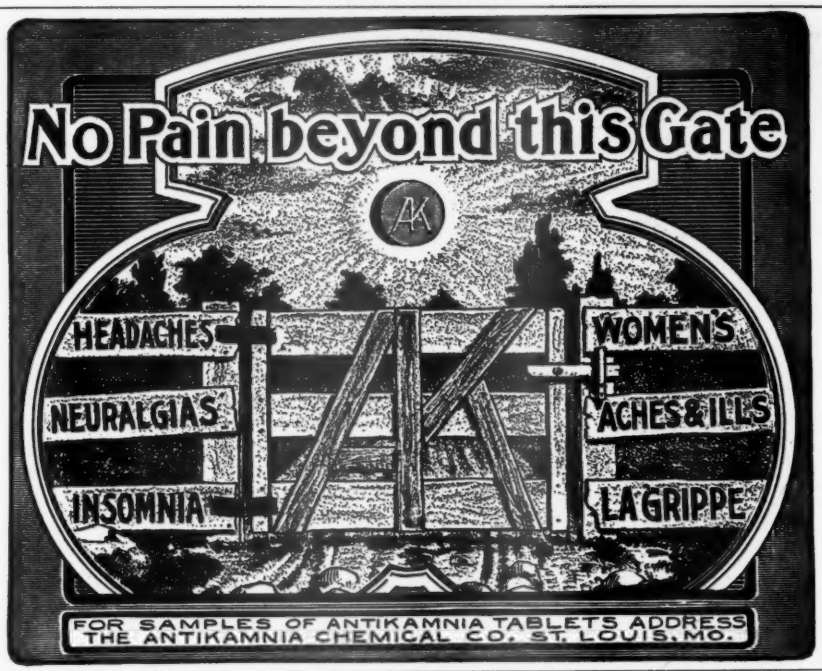

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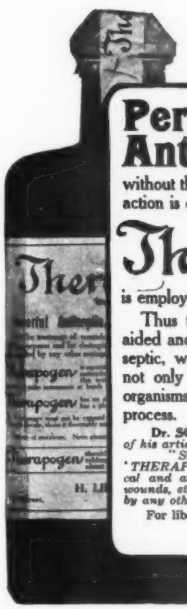

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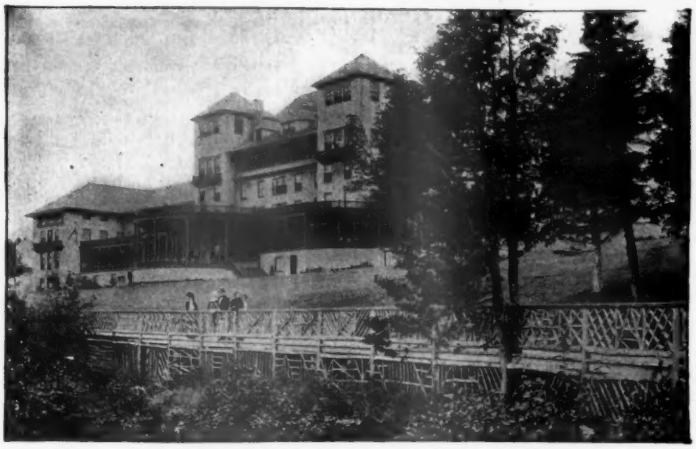

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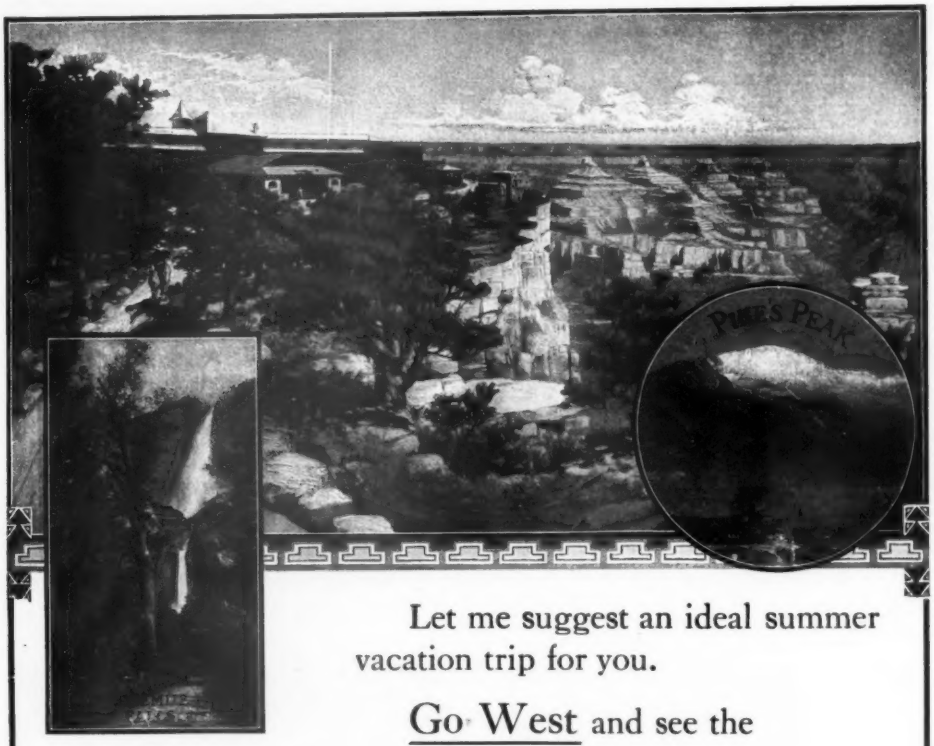

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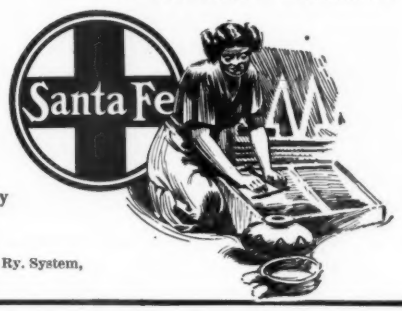

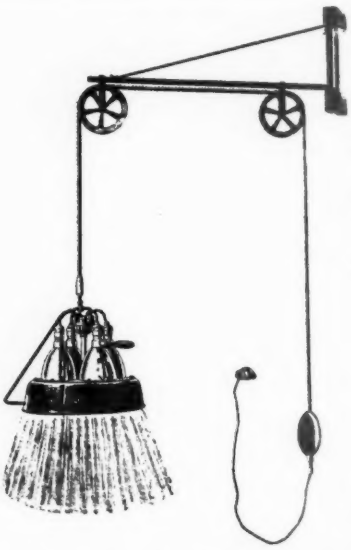

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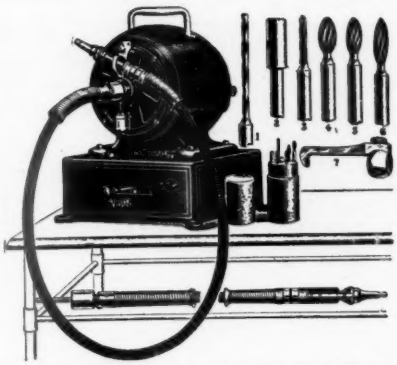

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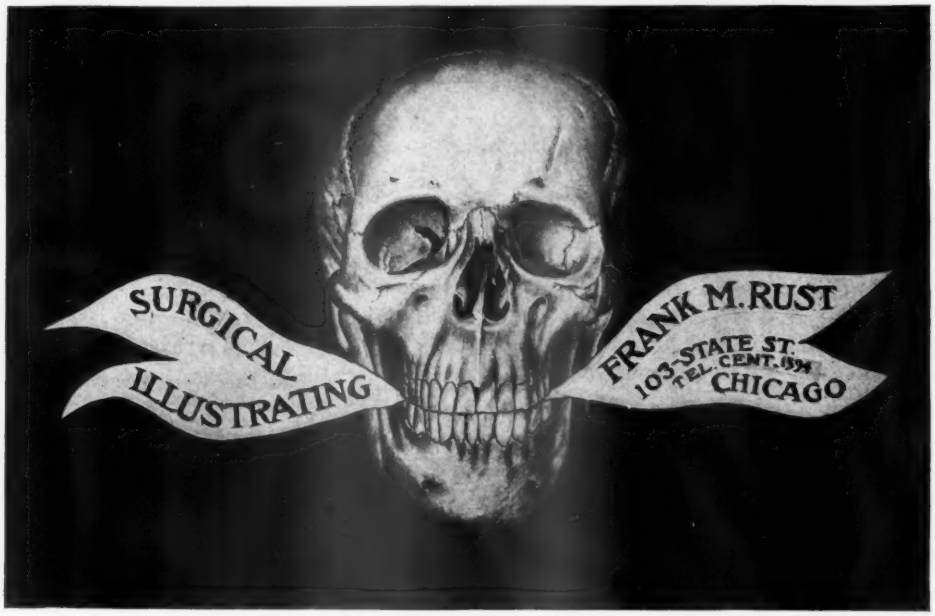

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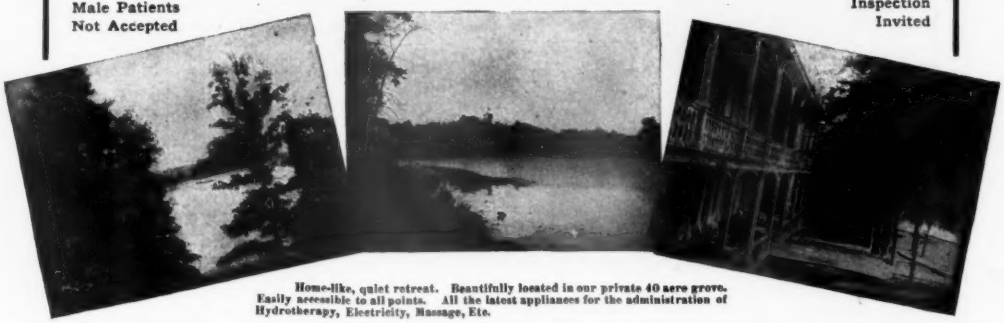

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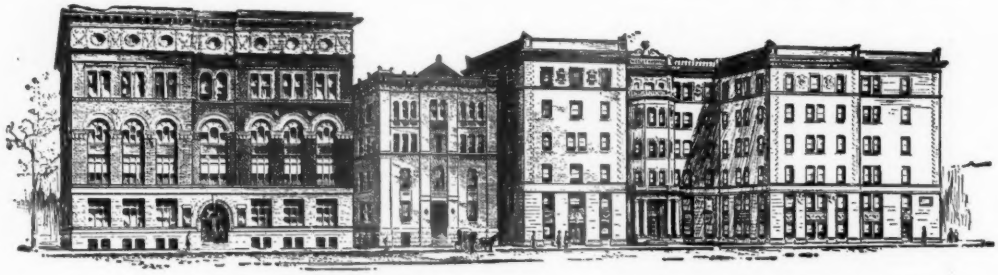

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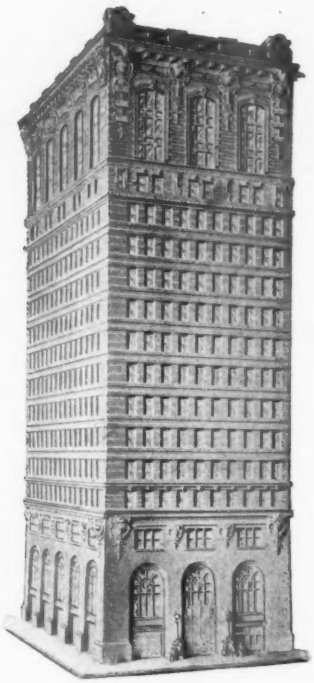

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